

**Motivational Interviewing for Smoking Cessation with Disadvantaged Pregnant Youth
and Young Mothers**

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By

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Abstract

Globally, smoking is the leading cause of preventable and premature death. Likewise, there are numerous adverse health effects for children exposed to either maternal smoking or environment tobacco smoke, although these risks decrease when smoking is stopped or reduced. At present the limited research on smoking interventions for pregnant youth and young mothers suggests that motivational interviewing could be effective. Thus, the purpose of the present study was to investigate whether MI, delivered to disadvantaged pregnant youth and young mothers within a smoke-free school setting, would increase interest in a quit smoking group delivered by a Maori cessation provider. Secondly, the study examined whether MI can promote smoking cessation or have a positive impact on smoking related behaviours in this population. The participants were seven students: aged 16-20, enrolled at a young parents' college, currently smoked and had at least one child or were pregnant. The participants received a school-based intervention that consisted of up to four MI sessions. Results indicated that not one participant expressed an interest in joining a quit smoking support group. However, one participant quit smoking at the six-month follow-up, which was confirmed bio-chemically. Several cases exhibited CO levels and weekly cigarette consumptions that illustrated reductions in their smoking quantity and frequency. Participant perceived importance to quit smoking was slightly higher than their confidence and participants were waiting longer to have their first cigarette of the day. However, the majority of participants experienced no consistent trends in their quit attempts, longest smoke free period, CO levels and frequency and quantity of cigarettes smoked as well as their desire, importance, confidence and motivation to quit. Future research should investigate more intensive MI interventions that adopt a holistic approach, including the family, with a focus on facilitating self-efficacy.

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List of Abbreviations

MRAG	Maori Research Advisory Group
NZ	New Zealand
MoH	Ministry of Health
WHO	World Health Organization
nAChRs	nicotinic acetylcholine receptors
APA	American Psychiatric Association
USDHHS	US Department of Health and Human Services
OECD	Organisation for Economic Co-operation and Development
AHH	Aryl Hydrocarbon Hydroxylase
ETS	Environmental tobacco smoke
FCTC	Framework Convention on Tobacco Control
NRT	Nicotine Replacement Therapy
RCTs	Randomised Control Trials
CBT	Cognitive Behavioural Therapy
MI	Motivational Interviewing
TTM	Trans-Theoretical Model
MET	Motivational Enhancement Therapy
CO	Carbon Monoxide
MINT	Motivational Interviewing Network of Trainers
<i>M</i>	Mean
<i>SD</i>	Standard Deviation
PHO	Primary Health Organisation
NCEA	National Certificate of Educational Achievement
Ppm	Parts per million
F/UP	Follow-up

1. Introduction

1.1 The issue of Cigarette Smoking

Tobacco consumption is the leading cause of preventable and premature death in New Zealand (NZ) and the world (Ministry of Health [MoH]), 2008; Taylor & Bettcher, 2000). This global public health issue is responsible for killing up to half of its users (World Health Organization [WHO], 2015) and has been known to cause detrimental health affects since the 1950's (Wynder, Graham, & Croninger, 1953; Doll & Hill, 1950). At present, direct tobacco consumption contributes to more than five million fatalities each year worldwide (WHO, 2015). Exposure to second-hand smoke kills more than 600,000 non-smokers each year worldwide, including children. As a result, numerous health organisations in NZ, such as the NZ MoH, Tūranga Tobacco Control and Action on Smoking and Health, are focused on improving tobacco cessation and smoking awareness.

However, despite this, tobacco consumption in NZ still accounts for approximately 5000 deaths every year (MoH, 2015). To address the issue the NZ Government have set a goal for the nation to be essentially smoke-free by 2025 (The New Zealand Government, 2011). In accordance with this objective, the smoking prevalence in NZ is decreasing and is currently at 17% of the adult population. The current youth smoking rate is 8%, and Maori remain the demographic with the highest smoking rate of 41% at present (MoH, 2014).

1.2 Tobacco Addiction

Koob and Volkow (2010) describe drug addiction as a chronically relapsing disorder, a cycle involving binge/intoxication, withdrawal/negative affect, followed by preoccupation/anticipation. In tobacco addiction maintenance of this cycle appears to result from a multifaceted combination of physiological, psychological and sociocultural factors (US Department of Health and Human Services [USDHHS], 2010; Christen & Christen, 1994). Typically smokers will make several attempts before being able to quit (USDHHS, 2010).

1.2.1 Physiological dependence to tobacco use. The main addictive chemical component in tobacco is considered to be nicotine, a mood altering psychoactive substance (USDHHS, 2010; Benowitz, 2008). This is because nicotine facilitates physiological effects such as reward, pleasure and addiction by activating the nucleus accumbens, via stimulation of the neurotransmitter dopamine in the ventral tegmental area of the mid brain (Rosenthal, Weitzman & Benowitz, 2011). Nicotine mediates the release of dopamine and other neurotransmitters by binding to and stimulating the nicotinic acetylcholine receptors (nAChRs).

However, chronic exposure to nicotine can cause desensitization of nAChRs resulting in tolerance to the effects of nicotine (Rosenthal et al. 2011). Thus, increasingly larger numbers of cigarettes are needed to achieve the same physiological effect (Christen & Christen, 1994). This further sustains cigarette use because during periods of abstinence, nAChRs become sensitized and feelings of cravings and withdrawal arise, causing the user to reintroduce nicotine to these receptors to alleviate withdrawal feelings (Rosenthal et al.

2011). Common withdrawal symptoms experienced when cigarette usage is discontinued include difficulty concentrating, irritability, frustration or anger, restlessness, increased appetite, insomnia and depressed mood (American Psychiatric Association [APA], 1994).

It is important to mention that immature inhibitory control systems in adolescents, who also have strong motivational drives for novel experiences, make this a particularly vulnerable developmental period for the experimentation with cigarettes (Chambers, Taylor & Potenza, 2003).

1.2.2 Psychological dependence to tobacco use. When smoking becomes habitual, rather than experimental, recreational or social, numerous smoking rituals are learned and reinforced (Christen & Christen, 1994). For instance, studies have indicated that nicotine can heighten responding to cues that function as conditioned reinforcement, such as specific situations, moods and environmental triggers because of their association with the rewarding effects of smoking (Guy & Fletcher, 2013; Olausson, Taylor, Jentsch 2004). Examples of triggers which are linked to the urge to smoke include; feelings of stress, fear, frustration and anger, driving, coffee drinking, talking on the telephone, consuming alcohol and relaxing after dinner or sex (Christen & Christen, 1994).

Moreover, some individuals are more prone to tobacco addiction, a vulnerability typically influenced by both nature and nurture (Christen & Christen, 1994). For example, studies suggest that tobacco addiction is more common among those with psychiatric and substance abuse disorders (Kalman, Morissette & George, 2005; Hatsukami, Stead, & Gupta, 2008) and that the heritability of tobacco addiction is at least 60% or greater (Maes et al., 2004; Vink, Willemsen, & Boomsma, 2005). One study found that the urgency to smoke

after waking was the most heritable underlying vulnerability as well as the best index to measure nicotine dependence (Haberstick et al. 2007). Furthermore, smokers compared to nonsmokers tend to share certain personality traits such as being risk-takers, sensation-seekers, extroverted, defiant, restless, impulsive, and rebellious and also believe that what happens to them is controlled by external forces (Christen & Christen, 1994). Those who smoke may have also experienced early emotional life events such as parental abuse or neglect, which could have negatively affected their self-worth and control.

1.2.3 Sociocultural considerations influencing tobacco use. In addition, numerous sociocultural factors such as bans on tobacco products, their cost, availability and social acceptability, as well as the modeling of parental and peer smoking, all have an influence on whether tobacco use is initiated or sustained (Hatsukami, Stead, & Gupta, 2008). For example, tobacco use is typically initiated during adolescence because peer pressure and acceptance through social conformity are strongly influential (Christen & Christen, 1994). Thus, smoking becomes a rebellious activity through which peer groups can bond, especially during the formative years when adolescents are actively trying to distance themselves from parental control. It is this experimentation with smoking that can eventually lead to dependency (Koob & Volkow, 2010).

Furthermore, compared to non-smokers, those who smoke are more likely to have one or more parent who smokes, a greater number of smoking friends and a partner who smokes (Christen & Christen, 1994). Also indicative of smoking behaviour is socioeconomic status, for instance, adults who live in the most deprived areas are 3.5 times more likely to smoke than those in the least deprived areas (MoH, 2014).

1.3 Health Implications Related to Tobacco Use

Besides nicotine, cigarette smoke also contains more than 7000 chemicals of which more than 70 are known to cause cancer and hundreds are toxic (USDHHS, 2010). Some of these toxins include sulphides, cyanide, carcinogenic hydrocarbons and cadmium (Jauniaux & Burton, 2007). As a result, smoking cigarettes is a major risk factor for cancer and circulatory disease and is linked to numerous health conditions such as respiratory diseases, hypertension and peripheral vascular disease (Organisation for Economic Co-operation and Development [OECD], 2013). Risk and severity of these diseases is directly linked to the amount and duration an individual has smoked (USDHHS, 2010). However, after an individual quits these risks decrease as the body has a chance to heal from the damage caused from smoking (Shields, Garner & Wilkins, 2013; USDHHS, 2010). In fact, long-term cessation (10 years for women) has been shown to improve health-related quality of life to a level similar to that of non-smokers (Shields et al. 2013).

Likewise, second hand cigarette smoke has been causally linked to serious respiratory and cardiovascular diseases in adults, respiratory problems and sudden death in infants and children (OECD, 2013). There is also the emerging risk of possible third hand smoke, which refers to the secondary toxins from cigarette smoke left on surfaces and in dust (Fleming, Anderson, Amin & Ashley, 2012). This is particularly concerning to children who have age-specific behaviours that would make them more vulnerable to third hand smoke.

1.3.1 Health implications of tobacco use during gestation. Maternal cigarette smoking is damaging to the fetus during every trimester of pregnancy (Jauniaux & Burton, 2007). This is because most of the toxins in tobacco smoke are water-soluble and have a

small molecular weight that enables them to cross the placenta. For example, Kutlu and Gozukara, (2007), found that cadmium and lead levels and Aryl Hydrocarbon Hydroxylase (AHH) activity increased in the placental tissue with the number of cigarettes smoked per day. They suggested that the accumulation of these toxic metals could interfere with placental function and have abnormal effects on the developing fetus. An example is cadmium, which has been causally linked to fetal growth restriction (Jauniaux & Burton, 2007). Furthermore, a review by Zdravkovic, Genbacev, McMaster and Fisher (2005) suggest that chronic maternal smoking in early pregnancy could affect placental development by reducing blood flow. Subsequently, this can generate a harmful hypoxic environment and decrease the supply of oxygen and micronutrients to the fetus.

Among other effects, smoking during pregnancy is associated with pre-term birth, low birth weight and fetal growth restriction (Vardavas et al., 2010). These same relationships however, are not significant between woman who stopped smoking early in pregnancy (before 12-15 weeks) and non-smokers (Vardavas et al., 2010; McCowan et al., 2009). Similarly, pre-term birth was the main focus of a case-control study by Fantuzzi et al., (2007) which was conducted in nine cities throughout Italy. The study evaluated 299 cases of pre-term birth, defined as children born before the 37th completed week of gestation, and 855 controls, born after the 37th week. However, those children in the sample who were born before the 35th gestational week were considered early pre-term births. Univariable and multivariable regression procedures were used to estimate associations. Active maternal smoking was found related to pre-term delivery and the association became stronger with children born before the 35th completed week of gestation. Both these relationships had a dose-response effect whereby the risk increased according to the number of cigarettes smoked daily.

In addition, other research has found maternal cigarette smoking during pregnancy a risk factor for sudden infant death syndrome, placenta previa, premature rupture of the membranes, perinatal and neonatal mortality, placental abruption and structural changes in the placenta (Andres & Day, 2000; Kyrklund-Blomberg, Hu & Gennser, 2006). Kyrklund-Blomberg et al. (2006), suggest that maternal cigarette smoking during gestation appears to promote the stiffening of the fetal aorta. They further imply that this decreased elasticity of fetoplacental arteries may be partly responsible for reports of high blood pressure in the offspring of smokers. Furthermore, maternal cigarette smoking is linked with reduced growth of the fetal brain, kidney and lung as well as smaller fetus sizes and placental volumes (Anblagan et al., 2013) and ADHD (Winzer-Serhan, 2008). These health implications of cigarette smoke on the developing fetus are of concern, especially when considering NZ's highest smoking prevalence is during the reproductive ages of 18-34 years (MoH, 2014).

1.3.2 Health implications of environmental tobacco smoke on children.

Environmental tobacco smoke (ETS) is also a major risk factor for respiratory problems in children (Cheraghi & Salvi, 2009). Children are most commonly exposed to ETS as a result of parental smoking. This issue is highlighted by research in Australia that examined risk of hospitalization with respiratory infection in a cohort of 4486 infants from birth to 12 months (Blizzard, Ponsonby, Dwyer, Venn & Cochrane, 2003). The study found a 50% greater risk of respiratory infection in those infants whose mothers smoked compared to those who did not. Furthermore, the study found that the risk increased if the mother smoked in the same room as the baby, higher if while holding the infant and higher again if while feeding the infant. The research indicated that poor smoking hygiene (i.e., smoking while feeding, holding or being in the same room as the infant) was most frequent among younger mothers,

and those who smoked more cigarettes per day. It is important to note however, that discriminating the effects of ETS after birth from those acquired from direct tobacco smoke exposure during pregnancy is sometimes difficult (Carlsen & Carlsen, 2008).

Similarly, respiratory problems related to current ETS exposure in the household have also been found among older children (12years) (Tsai, Huang, Hwang & Lee, 2010). These include recently diagnosed asthma, bronchitis and occurrences of wheezing. Additionally, health issues associated with ETS include: acute otitis media, respiratory tract infections, gastroenteritis, urinary tract infection, thrush and conjunctivitis (Ladomenou, Kafatos & Galanakis, 2009). The severity and frequency of these common infantile infections were found to relate positively to the amount of smoking in the family.

Children are affected more seriously than adults by ETS exposure because they have a smaller body mass and higher ventilation rates (Ladomenou et al. 2009). Thus, children appear to be particularly vulnerable to the effects of ETS and emerging evidence is suggestive of nicotine dependence symptoms occurring in never-smoking children who are exposed to ETS (Schuck, Kleinjan, Otten, Engels, & DiFranza, 2013). This is concerning as self-perceived nicotine dependence in never-smokers may increase smoking susceptibility in the future (Okoli, Richardson, Ratner & Johnson 2009).

1.4 Smoking Cessation Interventions

Consequently, it is not unexpected that by the 1990's, smoking had become a drastic public health problem that required effective international regulation (WHO, 2009). Thus, in 2003, the World Health Assembly unanimously adopted the WHO Framework Convention

on Tobacco Control (FCTC), an international public health treaty aimed at reducing the demand and supply for tobacco products as well as providing direction on tobacco control policies at regional, nation and international levels (WHO 2003). The FCTC came into force in 2005 and became one of the most widely embraced treaties in United Nations history with 168 parties at the end of 2009, including NZ (WHO, 2009).

As a result, smoke-free law in NZ is in accordance with the FCTC and currently consists of the Smoke-free Environments Act (1990), Smoke-free Environments Amendment Act (2003) and the Smoke-free Environments Regulations (2007). Taken together these Acts have created smoke-free workplaces, hospitality venues, public areas, schools and early childhood centres (WHO, 2005). In addition, the Acts have permitted the regulation of tobacco product, promotion, advertising, marketing, labeling, labeling with graphic pictorial health warnings and sponsorships (WHO, 2005; WHO, 2013). Other policies include the restricted sale of tobacco products to those over 18, disclosure of the contents of tobacco products and the introduction of three annual 10 percent progressive tax increases on tobacco in 2010. The Smoke-free Environments Act (1990) is currently being amended to introduce a plain packaging regime thought to make smoking less attractive to children (WHO, 2014).

Individuals who smoke can access smoking interventions directly, for instance, effective medications that increase long term quit rates in adults include nicotine replacement therapy (NRT), bupropion, nortriptyline and varenicline (Stead et al. 2012; Cahill, Stead, Lancaster, 2012; Hughes, Stead, & Lancaster, 2014). In addition, studies support that both individual counseling from a smoking cessation specialist and group therapy can assist smokers to quit (Lancaster & Stead, 2005; Stead & Lancaster, 2005). However, there is no evidence for a greater effect of intensive individual counseling compared to brief individual

counseling (Lancaster & Stead, 2005). Furthermore, randomised control trials (RCTs) support the increased effectiveness of combining pharmacological and behavioural interventions for smoking cessation (Stead & Lancaster, 2012a; Stead & Lancaster, 2012b).

1.4.1 Smoking cessation interventions for pregnant women and youth. For populations such as pregnant woman and youth, evidence on pharmacotherapy for smoking cessation is less clear. For instance, NRT is the only pharmacotherapy for smoking cessation that has been tested during pregnancy and the evidence is insufficient to conclude its effectiveness, safety, and impact on birth outcomes (Coleman, Chamberlain, Davey, Cooper & Leonardi-Bee, 2012). Nevertheless, use of NRT during pregnancy can avoid exposure to teratogens in cigarette smoke, for example carbon monoxide (Tappin et. al, 2005). Similarly, there appears to be no benefit for youth who use medications to stop smoking, although studies are small, and more RCTs need to be conducted (Stanton & Grimshaw, 2013). Alternatively, behavioural interventions for pregnant woman and youth appear to be more beneficial for smoking cessation (Stanton & Grimshaw, 2013; Chamberlain et al., 2013).

For instance, counseling can support pregnant women to stop smoking when they are provided with other strategies or tailored to the individual (Chamberlain et al., 2013). Counseling includes interventions such as cognitive behavioural therapy (CBT) and Motivational Interviewing (MI). Yet, it is unclear whether any types of counseling are more effective for pregnant women than others. In addition, feedback on fetal or maternal health status related to smoking, when combined with other strategies, appears to be more effective for smoking cessation than usual care. Other effective interventions for smoking cessation with pregnant women include: peer support and financial incentives, which are targeted on smoking cessation.

Behavioural interventions for smoking cessation that have significant success rates with youth are complex and include those based mostly on the Trans-Theoretical Model (TTM) and forms of motivational enhancement, cognitive-behavioural techniques and social influence approaches (Stanton & Grimshaw, 2013; Sussman, Sun & Dent, 2006). In addition, higher quit rates have been found in classroom and school-based clinic modalities and for programs with five or more quit sessions (Sussman et al. 2006). There is support for motivational enhancement interventions with youth, which include MI (Stanton & Grimshaw, 2013).

1.5 Models of Smoking Cessation

1.5.1 Trans-Theoretical Model. Prochaska and DiClemente (1982) developed the TTM through examining smokers who quit on their own and those who quit with treatment. The model is a framework for understanding an individual's readiness for change, decisional balance (pros and cons of the behaviour, e.g. smoking) and temptations (beliefs about changing the behaviour) (Prochaska, DiClemente & Norcross, 1992). The model proposes that an individual progresses through five stages of behaviour change: pre-contemplation (not considered changing behaviour); contemplation (considering change within the next 6-months); preparation (planning to change within the next 30 days); action (successfully changed over past 30 days) and maintenance (successfully changed for six months) (Baker, et. al., 2012; Erol & Erdogan, 2008). The stages are not linear and individuals typically revisit stages several times before the cessation of the addiction.

The TTM suggests that people hold different beliefs about change in each stage and that different strategies are needed to move between stages. As a result, the model promotes interventions that are stage appropriate, which neglects interventions that may work for all people (West, 2005). West (2005) questions the models attempt to categorise individuals based on the assumption that their plans are stable, discusses the models disregard for the unconscious mechanisms of addiction and inability to explain individuals who are spontaneous quitters. West (2005) goes on to suggest the need for a better model of behaviour change (read West [2005] for a full critique of the TTM), however, research still incorporates the TTM with MI for smoking cessation (Baker, et. al., 2012; Karatay, Kublay & Emiroglu, 2010; Erol & Erdogan, 2008).

1.5.2 The SNAP Model. An alternative theory to the TTM is the PRIME (plans, responses, impulses, motives and evolutions) theory of motivation, which suggests that people's deliberate behaviours are driven by their desires at that precise moment (McEwen & West, 2010). The SNAP (smoking, not smoking, attempting, planning) model incorporates the PRIME theory in that generating quit attempts is about creating a momentary desire to stop or setting a definite quit date in the immediate future. In contrast to the TTM, the SNAP model takes into account that some people plan to stop smoking and others do not.

2. Motivational Interviewing

Motivational Interviewing has developed substantially since its first introduction over 30 years ago in an article titled “Motivational Interviewing with Problem Drinkers” published in *Behavioral Psychotherapy* (Miller, 1983). This article was the prelude to three subsequent editions of *Motivational Interviewing* written by Miller and Stephen Rollnick, published in 1991, 2002 and 2013 (Miller & Rollnick, 2013). The editions evolved from facilitating change for addictions, to encompassing an extensive range of other problem areas and settings, and incorporating new information from recent research on MI.

The latest edition restructures the MI approach around four broad processes - engaging, focusing, evoking and planning (Miller & Rollnick, 2013). These four processes of MI will be discussed in accordance with three other rudiments important to MI including client change language, the spirit of MI and core communication skills. In addition a brief overview and description of MI will be presented as well as a small review on MI literature. *Figure 1* depicts one way these four components interlink to form MI (Rosengren, 2009)

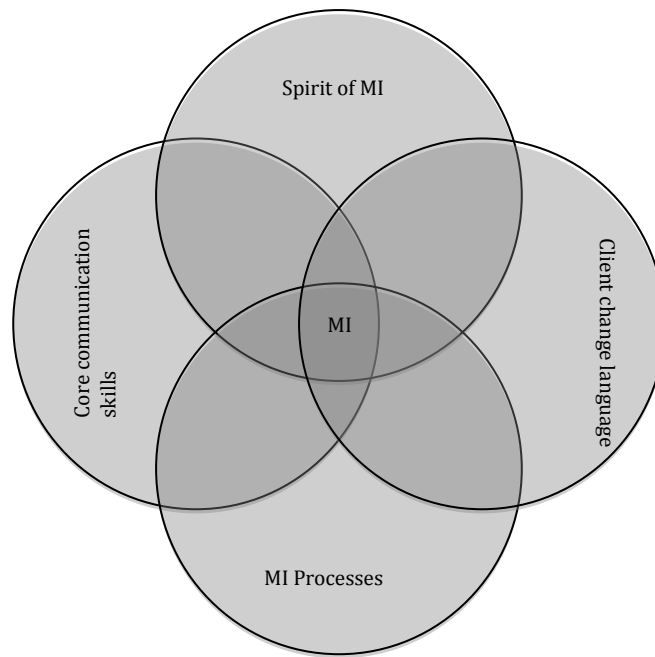


Figure 1: MI Components.

2.1 What is Motivational Interviewing?

Motivational Interviewing is a person-centered counseling style that evokes and strengthens intrinsic motivation for change whilst promoting the exploration and resolution of ambivalence (Miller & Rollnick, 2013). The practitioner allows for the contemplation of change through self-talk. This permits the client to express and reflect both the positives and negatives of their present alternatives. Hence, the practice of MI involves guiding conversations to evoke natural language about change based on the person's own values, interests and attitudes so that they talk themselves into change.

2.1.1 Ambivalence and client change language. The simultaneous occurrence of conflicting motivations and arguments for and against change is denoted as ambivalence and is a normal part of considering change (Miller & Rollnick, 2013). In MI any speech that

favours change is called change talk whereas arguments against change are sustain talk. A predominance of sustain talk or an equal contribution of both sustain and change talk predicts maintenance of the status quo. Conversely, change talk, if stronger and more predominant, predicts subsequent behaviour change (Miller & Rollnick, 2013; Gaume, Gmel, & Daeppen, 2008; Amrhein, Miller, Yahne, Palmer & Fulcher, 2003). Therefore, an important role of the practitioner in MI is to guide the conversation to elicit change talk from the client thus allowing them to articulate their reasons for change (Miller & Rollnick, 2013), particularly because people tend to be more persuaded by what they hear themselves say rather than what others tell them (Self-perception theory: Bem, 1972).

2.1.2 The style of motivational interviewing. Motivational Interviewing is a guiding style that is goal-directed, giving attention to client change language and seeking to elicit the person's own arguments for change (Rollnick, Miller & Butler, 2008). The practitioner evokes self-advice and motivation that is already present in the client, rather than trying to install it. Individuals are more motivated to make change when it's based on their own choices and decisions, rather than being informed what to do by an authority figure (Reactance theory: Brehm, 1966; Self-determination theory: Deci & Ryan, 1985). In effect, the guiding style of MI makes the client feel engaged, empowered, open and understood (Miller & Rollnick, 2013).

2.2 The Spirit of Motivational Interviewing

The spirit of MI comprises of four key interrelated elements; partnership, acceptance, compassion and evocation and these are the underlying perspectives with which one practices

MI (Miller & Rollnick, 2013). This mindset of MI has been regarded as essential to good practice and the effectiveness of MI.

The first fundamental aspect of the spirit of MI is partnership, regarded as an active collaboration between experts (Miller & Rollnick, 2013). The practitioner is a companion that seeks to provide a positive interpersonal environment that encourages change without being coercive. The practitioner acknowledges that the person is an expert on himself or herself and moves with the person rather than against them. Partnership is important; as a practitioner cannot accomplish client change on their own. Expertise from both participants complement each other to activate change and thus involves letting go of the need for the practitioner to answer the person's dilemma. Instead, the partnership requires respect for the client by listening and supporting the person through their story. This has the effect of activating the client's own resources and motivation for change without the practitioner imposing their own, because it is the client's own reasons for change that are most likely to trigger behaviour change (Rollnick et al., 2008)

Acceptance of what the client brings is another vital aspect of the spirit of MI (Miller & Rollnick, 2013). At the fundamental level acceptance can be understood by four notions derived from the work of Carl Rogers (1959), absolute worth, accurate empathy, autonomy support and affirmation. Absolute worth involves respect and trust for the inherent worth and potential of a person (Miller & Rollnick, 2013). Accurate empathy is taking an active interest in the client's internal perspective and making an effort to understand their frame of reference as if it were your own. Linked to this concept is autonomy support, which is to give honor and respect a person's right to autonomy and their capacity of self-direction. Ironically, accepting a person's right and freedom not to change can sometimes make change possible

(Rollnick et al., 2008). The final aspect of acceptance is affirmation whereby the practitioner ascertains and recognises the strengths and efforts of a client and communicates them back to the individual (Miller & Rollnick, 2013). Taken together, these four aspects encapsulate acceptance, which can reduce defensiveness and facilitate change.

The third element, compassion, has only been recently introduced into the spirit of MI and is concerned with the active promotion of the welfare of others (Miller & Rollnick, 2013). This is to give value and priority to the needs and well-being of the client, with their best interests in mind. Compassion was added to the underlying spirit of MI because previously with the other three elements alone, it was possible for the practitioner to practice in the pursuit of self-interest.

Evocation is the final element of the underlying spirit of MI and is based on the premise that the client has what is needed within them and the practitioner's responsibility is to evoke it (Miller & Rollnick, 2013). Therefore, instead of searching for the person's deficits and trying to install what is not there, the practitioner focuses on drawing out the person's resources and strengths. For instance, people who are ambivalent about change already possess both arguments for and against change. Therefore the practitioner can evoke and strengthen the change talk of the client.

2.3 Processes of Motivational Interviewing

Motivational Interviewing is comprised of four overlapping processes categorised as *engaging, focusing, evoking and planning* (Miller & Rollnick, 2013). These processes are both sequential and recursive, denoting that one must complete each step in order to create a

foundation for the next, yet the processes may also overlap, flow into each other or recur. It is the union of these four processes that best describes MI.

The initial process is *engaging* and is established through a mutually trusting connection and a respectful working relationship. This leads to *focusing* on a specific agenda, the second process, which allows the practitioner to acquire and maintain a particular direction or goal in the conversation about change. It is this directionality of the processes of MI that separate MI from Carl Rogers “non-directive” client-centred counseling approach (Miller & Rollnick, 2009). Once the client and practitioner have focused on these change goals, the third process of MI involves *evoking* the client’s innate motivation for change (Miller & Rollnick, 2013). This at some point may lead to the final process of MI, *planning*, whereby the client devises a plan of action and develops a commitment to change. The practitioner aims to elicit the client’s own solutions and continues to reinforce change talk as the plan surfaces. All of these processes are on-going and may need to be revisited as new obstacles and priorities emerge.

2. 4 Communication Skills used in Motivational Interviewing

There are five core communication skills that are strategically used throughout MI. These comprise: asking open questions, affirming, reflecting, summarizing and providing information and advice with permission (Miller & Rollnick, 2013). The first four skills form the mnemonic acronym OARS, by which they are often referred to in MI literature (Rosengren, 2009). These skills are shared with person-centered approaches and many other forms of counseling (Miller & Rollnick, 2013).

Reflective listening is considered the principle skill upon which MI is constructed (Rosengren, 2009). Reflective listening involves making statements about the meaning of what the client has said to provide clarity and understanding, allowing the client to hear their thoughts in different words and contemplate them (Miller & Rollnick, 2013). Reflective listening is fundamental to MI in that it permits the interviewer to select and reflect certain aspects of the client's speech. This is useful in shifting clients away from problematic statements or for channeling them in directions that may be productive (Rosengren, 2009). In addition, reflective listening is helpful at creating momentum, encouraging exploration and enabling practitioners to express their empathy, interest and understanding of clients.

Similar to reflection is summarizing. Summarising refers to the skill of marrying together what that client has said during the session and providing it back to them in a linking passage. Often summarising is ended with a question that enables the person to add in what the interviewer has missed. This skill helps to transition between tasks and indicates that the clinician has been listening and understands the person.

The remaining three skills are also used widely throughout MI. Open-ended questions are used frequently in MI to invite the client to elaborate and to evoke change talk. In the evoking and planning processes, open questions assist to elicit client motivation and to devise a path toward change.

Affirmation in MI can be either general or specific. In general the practitioner honours and respects the clients worth, freedom of choice and ability to grow while remaining aware to specifically recognise and comment on the client's individual efforts, strengths and resources. Affirmations are important in counteracting the demoralisation felt

by clients who have had failed attempts to change, because they facilitate feelings of empowerment and self-efficacy (Rosengren, 2009).

Unlike person-centered counseling MI uses the skill of informing and advising when a client asks for it. The skill, when used in MI, is not delivered in a highly directive style because the information or advice is given with permission and the clinician allows the client reach their own conclusions about any material provided. This appears to be the appropriate manner in which to inform a client because giving advice without permission has been negatively associated with change talk (Catley et al., 2006).

2.5 Efficacy of Motivational Interviewing

There are now over 200 RCTs for MI, presenting favourable effects across many problem areas in the health domain (Miller & Rollnick, 2012). Originally MI was developed for the treatment of alcohol-use disorders (Miller & Rollnick, 1991) and has since been used extensively in this field (Vasilaki, Hosier & Cox, 2006). Indeed, findings suggest that MI for problem drinkers is 10% to 20% more effective than receiving no treatment and at least as beneficial as other active treatments such as the 12-step programme (Lundahl & Burke, 2009). Better treatment outcomes for substance abuse disorders are associated with higher doses of MI and using MI as a prelude to further intervention (Burke Arkowitz & Menchola, 2003).

MI has since been applied in numerous other problem areas including, but not limited to; diet and exercise, gambling, drugs, emotional well-being, parenting practices, smoking cessation and eating disorders (Lundahl & Burke, 2009). Studies indicate promise for MI in all of these areas showing that it is consistently more effective than no treatment or waitlist (*d*

= 0.28 – 0.40), effect sizes were significant and solidly in the small range (Cohen, 1988) and about equal to other active treatments such as CBT. However, MI is typically shorter than other treatments by about two to three sessions and requires less time per session.

Nevertheless, there are instances where MI can be less effective, for example, when a treatment manual is followed (Hettema et al., 2005), and when MI is provided in a group format as opposed to individually (Lundahl & Burke, 2009), although, there have been relatively few studies examining group delivered MI to validate such a conclusion.

It is important to note that there is a variant of MI called Motivational Enhancement Therapy (MET), which includes an additional feedback component based on standardised measures in an MI-consistent manner (Lundahl, Kunz, Brownell, Tollefson & Burke 2010). Motivational Enhancement Therapy ($d = 0.32$, $n = 50$) has been found significantly more effective than MI alone ($d = 0.19$, $n = 33$).

2.5.1 Individuals who can benefit from motivational interviewing. Motivational Interviewing can benefit a range of individuals, for example research has found gender, age and problem severity unrelated to treatment outcomes (Lundahl & Burke, 2009). Additionally, a meta-analysis by Hettema et al. (2005) found that MI might be more favourable for minority groups. Likewise, Lundahl et al., (2010), suggested that MI may be especially appealing to those who have been exposed to societal pressure and social rejection. Furthermore, in accordance with the conceptual model of MI, research supports that individuals with low motivation would benefit most from MI, with regards to smoking (Catley et. al., 2012; Hettema & Hendricks, 2010).

2.5.2 Durability of motivational interviewing. The beneficial effects from MI generally remain stable for at least six months post-treatment (Lundahl & Burke, 2009). Beyond this, the durability of MI varies, with some meta-analysis showing positive outcomes lasting for up to two years following treatment (Burke et al., 2003; Lundahl et al., 2010) and others with reasonable yet diminished effects up to only six months (Hettema et al., 2005; Vasilaki et al., 2006). Surprisingly, Project MATCH Research Group (1998) found the favourable effects of MI durable up to three years after treatment. However, it is important to note that Hettema et al. (2005) included studies that did not isolate the stand-alone effects of MI and Project MATCH Research Group (1998) used MET, the modified version of MI. Furthermore, Vasilaki et al (2006) only reviewed MI research that was conducted with problem drinkers and therefore the durability of MI in this area should not be generalised to other areas.

2.5.3 Delivery of motivational interviewing. At present the optimal number of sessions required for MI is unclear (Lai, Cahill, Qin & Tang 2010). Some evidence suggests that more MI sessions are likely to produce better outcomes (Lundahl & Burke, 2009). Despite this, MI is often brief and normally delivered in one or two sessions, as a stand-alone treatment or as a motivational prelude to additional intervention (Hettema et al., 2005). For instance, Brown and Miller (1993) indicate that even a single session of MI can produce lasting changes in the alcohol use of heavy adult drinkers. Lindson-Hawley, Thompson and Begh (2015) found single session MI interventions for smoking cessation as effective as those with multiple sessions and MI sessions shorter than 20 minutes (RR 1.69; 95% CI 1.34 to 2.12) more successful than sessions longer than 20minutes (RR 1.20; 95% CI 1.08 to 1.32). Lindson-Hawley et al. (2015) also suggest that MI delivered on the telephone is about

as effective as a face-to-face delivery for smoking cessation and that there is no incremental benefit of providing follow-up calls.

In general, meta-analyses have found that neither the degree nor profession of the practitioner delivering MI impacts on client outcomes (Lundahl et al., 2010; Heckman, Egelston & Hofmann 2010; Lundahl & Burke, 2009). Indeed, it is practitioners trained in MI or rated as highly consistent with MI that are most likely to elicit change talk and subsequently increase the possibility of client change (Moyers, Miller, Hendrickson, 2005; Hettema & Hendricks, 2010; Miller, Yahne, Moyers, Martinez, & Pirritano, 2004). However, the latest Cochrane review on MI for smoking cessation by Lindson-Hawley et al. (2014) found that MI is more effective when delivered by general practitioners (RR 3.49; 95% CI 1.53 to 7.94) rather than counselors (RR 1.25; 95% CI 1.15 to 1.36) or nurses (RR 1.24; 95% CI 0.91 to 1.68). Although, this result should not be overstated, as it is based on two relatively small studies and could be attributed to the rapport from long-term doctor patient relationships equally as much as to the benefits of MI.

3. Literature Review

3.1 Search Methods for Literature Review

Studies were identified by searching the following online databases: PsycINFO, Australia/New Zealand Reference Centre, Psychology and Behavioral Sciences Collection, PsycARTICLES, SocINDEX with Full Text, PsycBOOKS, CINAHL with Full Text, Academic Search Complete, ERIC, Education Research Complete, SPORTDiscus, and MasterFILE Premier. The terms used in the title or abstract, or as keywords to search these databases include: motivat*, interview*, ehanc*, thearapy, intervention, program*, tobacco, smok*, nicotine, cessation, dependence, quit*, stop*, pregnan*, gestation, youth, adolescen* postpartum, maternal, young mother*, mother* child*, infant and fetus. Additional searches were achieved by reading all tobacco related studies in the Cochrane Library, by examining the reference lists of all relevant studies and meta analyses as well as searching for studies on the motivational interviewing web page (<http://www.motivationalinterviewing.org>). Studies that could not be accessed online were searched for in libraries.

Studies were included in the review if MI was used as an intervention for smoking cessation and if the participants were either pregnant youth or young mothers that smoked. Youth/young person was defined as those aged 12 to 24 (Ministry of Youth Development, 2014). However, as few studies met these criteria those with older pregnant samples, youth and similar relevant interventions were also mentioned.

3.2 Motivational Interviewing for Smoking Cessation

Progressively MI is being applied to smoking cessation, with the majority of trials published since 2004 (Hettema & Hendricks, 2010). Whilst the first published trial on MI for smoking cessation by Colby et al., 1998 found no differences compared to brief advice $\chi^2(1, N = 40) = 0.78, ns$, there was a small to medium effect size of $h = .28$ (Cohen, 1988). Hence, this established initial support for the potential efficacy of MI for smoking cessation.

Most subsequent research on the effectiveness of MI for smoking cessation has been RCTs and has yielded mixed outcomes with regards to its comparison with other intensive interventions for smoking (Lundahl et al., 2009). For example, a smoking focused meta-analysis by Hettema and Hendricks (2010) found the efficacy of MI for smoking cessation significantly equal to or better than other active treatments such as the 5A's model (Ask, Advise, Assess, Assist and Arrange), CBT and the TTM ($d = .17, p < .05$). However, the effect size was below Cohen's (1988) criteria for a small effect. Lundahl et al., (2010), on the other hand, found a negative effect size ($g = -.21$) suggesting that MI for smoking cessation was not as effective as other active smoking treatments like CBT.

Nevertheless, most meta-analyses agree that MI is more effective for smoking cessation than brief advice or usual care (Lindson-Hawley et al., 2014; Lundahl et al., 2009; Lai et al., 2010; Heckman et al., 2010; Hettema et al., 2005) and the latest Cochrane Review on MI for smoking cessation reported a modestly significant effect (risk ratio [RR] 1.26; 95% confidence interval [CI] 1.16 to 1.36) (Lindson-Hawley et al., 2014). However, MI for smoking cessation is less effective ($d = 0.14$) than MI for other problem domains such as alcohol ($d = .26$) and drugs ($d = .29$) (Hettema et al., 2005).

3.2.1 Motivational interviewing for smoking cessation with youth. Nevertheless, most research has suggested that MI with youth is no more effective than brief advice or no treatment for facilitating smoking cessation (Brown et al., 2003; Colby et al., 2005; Horn, Dino, Hamilton & Noerachmanto, 2007; Audrain-McGovern et al., 2011; Colby et al., 2012). Likewise, MET appears no more effective at improving cessation rates among adolescents than standard educational material (Helstrom, Hutchinson & Bryan, 2007). However, MET was significantly more effective than standard educational material at reducing smoking rates for adolescents with lower rates of alcohol consumption ($F[2,114] = 3.02, p=.05, \eta_p^2=.05$) and impulsivity ($F[2,116] = 3.15, p=.05, \eta_p^2=.05$), whereas those with higher rates benefited more from standard educational material. Brown et al., (2003) also found a significant interaction effect that suggested MI was more effective for youth who had little or no intention to alter their smoking but less effective than brief advice for those who did ($B = 0.32, SE = 0.13, sr^2 = 0.02, p = .01$).

In contrast, the smoking focused meta-analysis by Hettema and Hendricks (2010) indicated potential promise for MI in the field of smoking cessation for youth. Their subgroup analysis for those under 18 found significant combined effect sizes for MI at short ($d = 0.15$) and long-term ($d = 0.11$) follow-ups, although these effect sizes are below Cohen's (1988) criteria for a small effect. Further promise is reported in a study by Erol and Erdogan (2008) who delivered five 45-minute stage-based MI interventions to 60 high school students using three constructs of the TTM - contemplation, preparation and action. The intervention focused on the transitions between these stages and MI strategies were delivered based on a student's stage of change. They found that 18.3% and 33.3% participants had quit smoking at the three and six month follow-ups, respectively although; the authors concluded that the gains in smoking cessation were modest at best.

In addition, research on motivational smoking cessation programmes in schools such as Project EX, Not-on-Tobacco and Youth Quit2Win, suggest significantly higher quit rates, motivation and changes in smoking behaviours compared to standard care (Baker et al., 2012; Oredein, Foulds, Edwards & Dasika, 2008). These programmes all use motivational strategies such as MET, MI and TTM. At present, the most effective MI interventions with adolescents for smoking cessation appear to be multi-component incorporating MI with constituents such as cognitive behavioural skills training (Peterson, et al., 2009), TTM based interactive computer programmes with brief advice (Hollis, et al., 2005) or the 5A's model plus behavior change counseling (Pbert et al., 2008). Similarly, Grossberg (2012) supports fitting MI within a multi-component treatment for adolescent smoking cessation so that behaviour change skills can facilitate behavior change decisions.

Although the consensus of research suggests that MI alone as a treatment for youth smoking cessation is not particularly effective, MI has been found beneficial for other smoking-related behaviours among youth. For example, a pilot study by Bradley (2012) successfully used MI in the school setting to significantly reduce adolescent smoking ($z = -2.02, p = .04$) and symptoms of cigarette dependence ($z = -1.79, p = .07$), however, these findings are limited to a sample size of nine. Likewise, Audrain-McGovern et al., (2011) found that adolescents who received MI showed a greater reduction in the daily amount of cigarettes smoked than those who received structured brief advice (5.3 vs 3.3 fewer cigarettes per day). Kelly and Lapworth (2006) and Suzanne et al., (2012) also found significant reductions in the frequency and quantity of adolescent smoking in the short-term compared to brief advice, however this was not found significant in the long-term. Similarly, Colby et al., (2005) found a significant reduction in adolescent smoking three months after an MI

intervention, which was indicated by cotinine levels ($F(1,70)=3.10, p=0.09$). However, this result was not found at either the one or six month follow-up. What's more, MI has been found significantly more effective than brief advice at increasing youth self-efficacy to quit ($B = 3.46, SE = 1.78, sr^2 = 0.02, p = .04$) (Brown et al., 2003) and their refusal to smoke ($F(3,52)=2.73, p=.053$) (Kelly & Lapworth, 2006).

3.2.2 Motivational interviewing for smoking cessation during pregnancy.

Research on MI for smoking cessation among pregnant women is limited and has yielded a combined effect size of $d=.15$. The effect was not significant, smaller than non-pregnant samples ($d=.17, p < .05$) and below Cohen's (1988) criteria for a small effect (Hettema & Hendricks, 2010). Overall, most studies suggest that MI is no different to standard health promotion information for facilitating smoking cessation among pregnant woman (Tappin et al., 2000; Tappin et al., 2005; Stotts, DiClemente & Dolan-Mullen, 2002; Stotts, DeLaune, Schmitz & Grabowski, 2004; Ruger, Weinstein, Hammond, Kearney & Emmons, 2008; Stotts, et al., 2009; Hayes, et al., 2013). In addition, MET has been found no more effective than standard care practitioner advice for either the reduction or cessation of smoking in pregnant women, although women in this study were also opioid dependent (Haug, Svikis & DiClemente, 2004).

However, MI for smoking cessation with pregnant women has produced significant effects in certain subgroup analyses. For example, Stotts, et al. (2009) found that MI combined with ultrasound feedback did not significantly affect quit rates but did lead to a significant ($p=.02$) reduction in smoking for light smokers (≤ 10 cigarettes/day). In this study the intervention group received one MI session immediately after ultrasound, a feedback letter (information regarding cigarette smoke's adverse effects on the fetus) and one follow-

up telephone counseling session. The best practice group received counseling based on the 5A's Model, literature on prenatal smoking cessation and a helpline number. Results indicated that 34% of light smokers in the intervention group were abstinent at the end of their pregnancy compared to 25.8% of light smokers in the best practice group with ultrasound feedback. Heavy smokers (≥ 10 cigarettes/day) were unaffected by the intervention.

Similarly, post hoc implementation analyses in the Stotts et al. (2002) study with resistant pregnant smokers found that a greater number of participants who received the full MI intervention compared to those who received a lower dose were abstinent from smoking at post-test. What's more almost 10% of participants were abstinent compared to the control group that provided three-to-five minutes of counseling with self-help booklets. The intervention group had received two telephone MI sessions in addition to three-to-five minutes of counseling with self-help booklets. The result is even more striking considering that women from the intervention group who received either part of or all of the intervention were heavier smokers and more likely to have a partner that smoked than those in the control group.

It should be noted that the Stotts et al. (2002) study had methodological issues. For example, the study had group differences at baseline as the experimental MI group had a greater number of heavier smokers at intake compared to the control group. Moreover, urine samples used to indicate participant smoking status were only collected for a subset (under half) of the full-randomised sample, which decreased the statistical power to detect for differences and may have interfered with the sample's representation of the population.

However, the authors suggested that an MI intervention might achieve better results if more sessions were provided and delivered face-to-face rather than two sessions by telephone.

A study that did provide more MI sessions by Karatay, Kublay and Emiroglu (2010), found that MI promoted smoking cessation, smoking reduction and confidence to quit in pregnant woman 20 years and over. At the end of this study 39.5% of the participants had quit ($p<.05$) and a further 44.7% had decreased their initial smoking rate by 60% ($p<.05$). Both of these were statistically significant. Furthermore, the difference between the participants' first (61.36, standard deviation [SD]: 12.61) and last (93.34, SD: 27.04) self-efficacy scores was statistically significant ($p<.05$). The study employed five intervention home-visits and three follow-up visits with small intervals between visits. As a result, this higher intensity intervention may have contributed to the better results. The authors also concluded that the good response to the intervention could be attributed to the delivery in the home-setting where participants would have felt more at ease. However, their research is limited by the lack of a control group and to a small sample size of 38 women.

3.2.3 Motivational interviewing for smoking cessation with pregnant youth. The only studies known to include pregnant youth (16+) in their samples when investigating MI for smoking cessation with pregnant women were by Stotts et al. (2004) and Hayes et al. (2013). The latter study delivered MI sessions to 500 participants for up to nine months postpartum. However, both studies failed to significantly show that MI facilitated smoking cessation rates in this population.

The Stotts et al. (2004) study evaluated the impact of an MI intervention on TTM mechanisms in socioeconomically disadvantaged pregnant smokers. The MI intervention was

delivered over eight weeks and included one face-to-face MI session, three MI based calls over the telephone and a personalized feedback letter. Despite finding no impact on participant stage of change and smoking cessation in the intervention group compared to usual care, there were significant findings supporting greater confidence to abstain from smoking ($F[1,36] = 5.3, p < .05$), reduced depression rates ($F[1,36] = 6.5, p < .05$) and a decrease in temptation to smoke ($F[1,36] = 5.3, p < .05$). Usual care included the acknowledgment of participant smoking and a recommendation that they quit.

Stotts et al. (2004) argue that change strategies used to modify smoking behaviour may have been lacking from the participants' repertoire, hindering their ability to quit smoking. Subsequently, the authors suggest the need for more comprehensive and intensive interventions to improve smoking cessation rates in low-income pregnant smokers. For example, interventions could use additional strategies, like CBT, and provide face-to-face sessions which are delivered more frequently. Besides this, studies have suggested MI may have more promise as a prelude to more intensive smoking interventions or best fit within a multi-component smoking cessation treatment approach (Grossberg, 2012; Colby et al., 2012; Brown et al., 2003).

The other study by Hayes et al. (2013) delivered a total of five brief MI sessions on smoking cessation to participants from 12-20 weeks gestation to seven-nine months post-partum. Smoking cessation rates were not significant between the intervention group and control group (received hospital care as usual) in late pregnancy or at three-four months post-partum, although more cases were not smoking in late pregnancy (14.8%) compared to controls (13.1%). Hayes et al., (2013) used a very brief intervention compared to other studies, with MI sessions lasting between three-to-10 minutes. This may have impacted on

the effectiveness of the intervention. In addition, the MI training given to the health personnel delivering the intervention was condensed for the majority (83.3%) to one day instead of two, which may have affected the quality of the intervention. However, despite this, the intervention delivery was assessed as highly competent based on a post-training evaluation immediately after and at six months later.

3.2.4 Motivational interviewing for smoking cessation with young mothers. The Hayes et al. (2013) study, discussed above, appears to be the only known study that investigates smoking cessation with young mothers. Other research on MI for smoking with postpartum women is limited and tends to focus on those who have quit during or before pregnancy and investigates relapse prevention (Jimenez-Muro et al., 2013; Meghea et al., 2015). However, one of these studies included post-partum women who smoked and found that MI sessions delivered by telephone at three, six, nine and 12 weeks post-partum can promote the behavioural process of change with regards to quitting smoking (Jimenez-Muro et al., 2013). In the intervention group 90.7% of participants said they were prepared to make a quit attempt in the next six months compared to 18.3% in the control group ($p < .001$), who received a booklet (outlined the risks of smoking during breastfeeding). However, a recent Cochrane review by Baxi, et al (2014) was not able to determine one particular intervention for reducing parental smoking and child exposure to ETS, although seven studies in the review indicated that MI or intensive counseling delivered in the clinical setting were effective.

Nevertheless, A Stop Tobacco Outreach Programme for parents whose children were hospitalised for respiratory illness found that, at two months follow-up, out of 71 participants, 21% had not smoked in the past seven days, 49% had made a quit attempt and those who had

rules prohibiting smoking in the house went from 29% to 71%. (Winickoff, Hillis, Palfrey, Perrin & Rigotti, 2003). The programme included a motivational interview, NRT, written materials, telephone counseling and referral to their clinician. Similarly, caregivers of child with asthma who were provided with MI were more likely to be abstinent from smoking at two ($OR = 2.80$; 95% $CI = 0.95–8.18$) and three months ($OR = 1.68$; 95% $CI = 0.64–4.37$) follow-up compared to those receiving counseling intervention modeled around the clinical guidelines for smoking cessation (Borrelli, McQuaid, Novak, Hammond & Becker, 2010). However, these outcomes were not significant. The MI in this study used feedback on the caregiver's carbon monoxide (CO) levels and the child's ETS exposure.

3.3 The Present Study

The purpose of the present study was to investigate whether MI, within a smoke-free school setting, can promote smoking cessation or have a positive impact on smoking related behaviours among disadvantaged pregnant youth and young mothers. The study focused on adolescents with children who did not wish to stop smoking and examined whether MI would increase interest in a quit smoking group delivered by a Maori cessation provider.

3.3.1 Rationale for the present study. After the Christchurch earthquakes a Primary Health Organisation (PHO) provided funding for projects to address the increased need for smoking cessation support among Christchurch residents. One project that received funding was focused on providing smoking cessation interventions to high school students in schools in areas where the earthquakes had hit the hardest. The project also linked in with a wider smoke-free schools initiative by the Ministry of Education.

One of these schools was a decile one young parent's college. As part of this a number of teachers and school counselors were trained to be quit card providers. In addition a number of classroom sessions promoting smoking cessation were provided with an offer of an in school group or individual smoking cessation program tailored to youth.

This project was considered largely successful, with good engagement and increased smoking cessation attempts among students. Towards the end of this project it was noted that several students had resisted repeated offers of cessation support and were struggling with the smoke-free school environment. After discussion with the head teacher and health promoting school team it was decided that more motivational work could be done with these recalcitrant students with a view to increase their motivation to stop smoking and engage with smoking cessation support services, which is where the current study came in. The current study is the first known study to evaluate an MI intervention within a smoke-free school environment, for disadvantaged pregnant youth and young mothers who were reluctant to stop smoking, with an aim to increase interest in accessing school based smoking cessation support. The study examined whether the MI intervention would lead to:

- Increases in quit attempts and longest smoke free period.
- A decrease in smoking as evidenced by a reduction in carbon monoxide, as well as the reported frequency and quantity of cigarettes smoked.
- A decrease in nicotine dependence as evidenced by an increase in the length of time from waking till first cigarette.
- An increase in the recognition of the importance of quitting and an increase in confidence, motivation and desire to quit.

4. Methods

4.1 Funding and Approval

This study was approved by the University of Canterbury Ethics Committee (Appendix A) and funded by the Tobacco Control Research Tūranga Masters Scholarship (Appendix B). Tobacco Control Research Tūranga had no influence on the research and results presented in this thesis. A young parent's college agreed to participate in this research and data for this study was collected from the students currently attending the school.

4.2 The Young Parent's College

The young parent's college from which participants were recruited was specifically for pregnant youth and young parents under the age of 19, with an enrolment of between 20-30 students at any one time. There is a purpose built early learning centre on site that provides childcare while the students attend school. The college offers students the opportunity to achieve the National Certificate of Educational Achievement (NCEA) level 1, 2 and 3 and offers a wide range subjects by correspondence. The college operates Monday-Friday, from 9:15am to 3pm, for the four school terms, and provides student support including appointments with Family Planning, the School Nurse and Youth Service Family Workers.

The young parent's college advocates a smoke-free environment whereby smoking is not permitted on school grounds and several smoke free initiatives are embraced. These include awards for citizenship given to students for community involvement such as supporting others not to smoke and a star chart system that encourages students not to smoke

at school. The star chart was introduced during week three of the study to reward students who did not smoke at morning tea, lunch and afternoon tea. Rewards were given on an accumulative basis, for example, one at 10 stars, the next at 20 stars and so forth. The star chart was placed on the smoke-free wall at the college, which is also dedicated to the journeys of students who have quit cigarette smoking.

4.3 Participants

Participants were recruited from the young parent's college through a classroom presentation of the research delivered by the lead researcher and senior supervisor. During the presentation all students were given an information sheet that detailed the study (Appendix C), and a chance to ask questions at the end. Students were able to privately approach the lead researcher after the presentation about participating in the study. Alternatively, they had the opportunity to ask about participating in the research when the lead researcher was visiting the college on data collection days or by emailing their interest to the address supplied on the information sheet. If a student was interested in participating in the study they were given an information sheet, a verbal description of what the study involved, a participant consent form (Appendix D) and if under 18 years, a parental consent form (Appendix E). Students who agreed to participate were required to return the signed participant consent form and parental consent form, if under 18 years, to the lead researcher as soon as possible. Consent to participate in the study was given by 10 students.

Participant criteria included female students who were enrolled at the young parent's college, who currently smoked and had at least one child or were pregnant. Currently

smoking was defined as at least one cigarette per month in accordance with the New Zealand Health Survey (2013/14) (MoH, 2014). However, most participants were daily smokers.

Three participants were withdrawn from the study because two became truant from school and the other had medical complications that prevented her from completing the study. The characteristics of these participants are displayed in Table 1. Education was the only notable difference between students who were withdrawn and those who participated, all students who were withdrawn had no qualifications whilst the majority who participated had NCEA level 2 as their highest qualification.

Table 1

Demographic Characteristics of Participants who Did Not Complete the Study.

Name	Age	Highest Qualification	Number of Children	Ethnicity
Withdrawn 1	17	None	1	NZ European
Withdrawn 2	19	None	1	NZ European/Māori
Withdrawn 3	19	None	1	NZ European

Of the remaining seven participants, five identified as NZ European decent, one as Māori and one participant as both NZ European and Māori decent. The age of participants ranged from 16-20 years, the majority had one child and Level 2 NCEA as their highest qualification. All participants spoke English as their predominate language and lived in Christchurch. At the commencement of the study none of the participants were pregnant, however during the study three participants became pregnant. The demographics and

characteristics of each participant are shown in greater detail in Table 2. Case numbers have been used to preserve the anonymity of the participants.

Table 2

Demographic Characteristics of Participants

Name	Age	Highest Qualification	Number of Children	Ethnicity
Case 1	20	NCEA Level 2	1	NZ European
Case 2	19	NCEA Level 2	1	NZ European
Case 3	18	NCEA Level 2	1	NZ European
Case 4	17	None	2	Māori
Case 5	16	NCEA Level 1	1	NZ European
Case 6	18	University Entrance	1	NZ European
Case 7	19	NCEA Level 2	1	NZ European/Māori

4.4 Procedure

At the commencement of baseline participants completed the initial questionnaire (Appendix F). Thereafter data collection days occurred weekly on Tuesdays and Thursdays, at the young parent's college, from baseline through to four weeks post-intervention. Participant Carbon Monoxide (CO) levels were measured both days, however the weekly questionnaires (Appendix G) were only administered and completed on Thursdays. During school holidays all participants consented to weekly data collection, on the same days, from their homes. Participants were phoned prior to the home visits as a reminder. If a participant could not be reached at home or school on data collection days they were either followed up the next day, or completed the questionnaire over the phone. However, if the participant was

not present that entire week or did not answer their phone, data for that week was unable to be obtained.

The length of each participant's baseline data varied, ranging from eight-13 weeks, because the study used a non-concurrent multiple baseline across participants design (Barlow, Nock & Hersen, 2009). Following this, participants received up to four MI sessions (free of charge) during the intervention phase. The length of the intervention and number of sessions varied due to school commitments, frequent absences, school holidays and children who were sick. As a result, some participants received all four MI sessions whereas others attended one.

During the first week after a participant received their last MI session, the follow-up questionnaire was completed (Appendix H). However, if a participant was not available to fill out the questionnaire, it was completed in either the second week post-intervention or over the phone. At the three and six month follow-ups participants completed the follow-up questionnaire, weekly questionnaire and had their CO levels measured. Participants were followed up daily until available to supply this data.

4.5 Motivational Interviewing Intervention

All participants in the study were provided with the opportunity to have up to four MI sessions. A PhD level psychologist who was a member of the Motivational Interviewing Network of Trainers (MINT) delivered these. One hour was allocated to each session. Case's 1 and 3 received four MI sessions, Case's, 2, 4 and 7 received three sessions, Case 5

received two sessions and Case 6 received one session. A total of 20 MI sessions were delivered among all participants.

4.6 Measurements

4.6.1 Initial, follow-up and weekly measures. Initial, follow-up and weekly questionnaires were all acquired from a study by Oredein et al. (2008). The questionnaires were appropriate for the present study as the research aims were comparable. For instance, Oredein, et al. (2008) presented the promising development and preliminary outcomes of a school-based smoking cessation and education programme called Youth Quit2Win. Similar to the present study Youth Quit2Win addressed smoking cessation through increasing motivation to quit. The questionnaires in their study incorporated items from the Hooked On Nicotine Checklist (DiFranza et al., 2002), the Fagerstrom Test of Nicotine Dependence (Fagerstrom, 1978) and the nicotine dependence criteria as stated in the Fourth Edition Diagnostic and Statistical Manual of Mental Disorders (APA, 1994). Consequently, these questionnaires were constructed of items obtained from scales with high validity and reliability (Wheeler, Fletcher, Wellman & DiFranza, 2004; Buckley et al., 2005).

The baseline questionnaire from the Oredein, et al. (2008) study was used as both the initial and follow-up questionnaire in the present study. The questionnaire collected basic demographic information and asked participants about their history of tobacco use, nicotine withdrawal symptoms, quit history, motivation to quit and social support networks. The first of the weekly questionnaires was a shortened version of the initial questionnaire, used by Oredein, et al. (2008) as a weekly assessment measure. The questionnaire asks participants

about their tobacco use, motivation to quit and withdrawal symptoms over the past seven days.

Figure 2 displays the ruler, on which, weekly motivation to quit smoking was measured by participants. The ruler was taken from the Oredein, et al. (2008) study, however scaled from zero to four for easier graphing in the results section (Labeled in italics in Figure 2).

Not at all Motivated (<i>0</i>)	Slightly Motivated (<i>1</i>)	Somewhat Motivated (<i>2</i>)	Very Motivated (<i>3</i>)	Extremely Motivated (<i>4</i>)
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Figure 2: The Ruler Used for Measuring Participant Motivation to Quit Smoking

Additionally, importance and confidence rulers (Miller & Rollnick, 2013) were used weekly (Appendix 8). The rulers were scaled from zero-10 where zero means not at all important or confident and 10 means extremely important or confident (Figure 2).

Participants were asked to circle the number that best described their perceived importance or confidence (depending on the scale) to quit smoking at present.

0	1	2	3	4	5	6	7	8	9	10
Not at all (<i>Important or Confident</i>)										Extremely (<i>Important or Confident</i>)

Figure 3: An Example of an Importance or Confidence Ruler

Typically these rulers are used during MI sessions to elicit change talk. For example, if a client suggests that their perceived confidence to quit smoking is a four the practitioner can ask why are you a four and not a one (Miller and Rollnick, 2013). However, these rulers

were used weekly as questionnaires in the present study because increases in both importance and confidence are vital to an individual's motivation for change (Miller and Rollnick, 2013).

4.6.2 Carbon monoxide monitor. The CO monitor was used to measure CO levels in each participant's expired breath. The monitor measures the level of CO in parts per million (ppm) and reads a score of, or between, 0-6ppm to 20+ppm that depicts how heavily a participant is smoking. The measurements and the degree of smoking that they indicate are listed in Table 3.

Table 3

Level of Smoking as indicated by CO levels

Level of Smoking	CO Monitor Measurement
Heavy Smoker (3)	20+ppm
Smoker (2)	11-20ppm
Light Smoker (1)	7-10ppm
Non-Smoker (0)	0-6ppm

When a CO level recording was taken, the time of that participant's last cigarette was also recorded. This is because the CO monitor is only accurate in detecting quitters who have not smoked for at least 24 hours (Health NZ, 2009). In addition, this precaution was taken because once an individual finishes a cigarette the CO in expired air falls rapidly in the first five minutes and then slowly over the next hour (total CO half-life is five hours). Thus all measurements were taken at least five minutes after a participant's last cigarette and all participant CO levels were recorded routinely at mid-morning each time to ensure

consistency. Carbon Monoxide levels were reported on a scale from zero to three in the results section. Table 3 displays the numbers zero to three in italics that correspond to each measure.

4.7 Data Analysis

Means (*M*) and standard deviations (*SD*) were calculated for participant data to look for overall group trends. Data gathered from the weekly questionnaires were displayed in multiple baseline graphs created in sigma-plot and visually analysed for trends.

5. Results

This chapter details the study's results and is presented in the following format. To begin with Individual case descriptions are given explaining the general circumstances of each participant throughout the study. These descriptions include a timeline of each participant's involvement in the study. The next section presents tables, descriptive statistics, multiple baseline graphs and descriptions of each participant's smoking behaviour, nicotine dependence, desire to quit, importance, confidence and motivation to quit, quit attempts and withdrawal symptoms during the study.

5.1 Case Descriptions

5.1.1 Case 1. During the entire study Case 1 lived with her parents in a home that was smoke-free indoors and included other smokers. She was allowed to smoke outside at home. Case 1 was in a relationship during the study but did not live with her partner. Her partner was only a smoker at the six-month follow-up, yet most of her close friends were smokers throughout the study. Case 1 was pregnant during the study, however lost the pregnancy at 11 weeks during week 16 of the study. Figure 3 displays the timeline of Case 1's participation in the study. She completed four MI sessions.

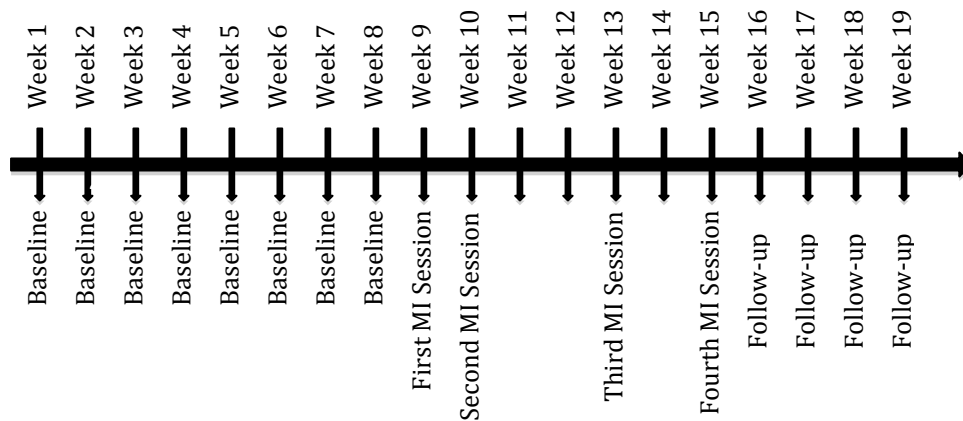


Figure 4: Timeline of Case 1's participation in the study

5.1.2 Case 2. During the study Case 2 lived with her parents in a home that was smoke-free indoors, with non-smokers, until the six-month follow-up. At the six-month follow-up she began to rent in an indoor smoke-free home elsewhere, with a smoker. During the entire study Case 2 was single, was allowed to smoke outside at home, and most of her close friends were smokers. Figure 4 displays the timeline of Case 2's participation in the study. She completed three MI sessions.

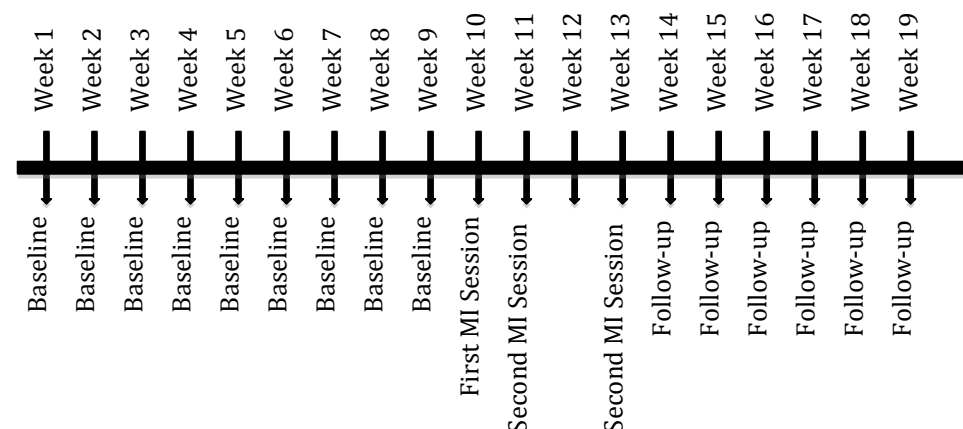


Figure 5: Timeline of Case 2's participation in the study

5.1.3 Case 3. During the entire study Case 3 lived with her parents in a home that was smoke-free indoors and included other smokers. She was allowed to smoke outside at home.

Case 3 was single at baseline and post-intervention, however entered a relationship with a smoker at the three-month follow-up whom she lived with in addition to her parents. This altered again at the six-month follow-up when her new partner was a non-smoker, with whom she did not live. During the study most of her close friends were smokers. Case 3 was 12 weeks pregnant at the six-month follow-up. Figure 5 displays the timeline of Case 3's participation in the study. She completed four MI sessions.

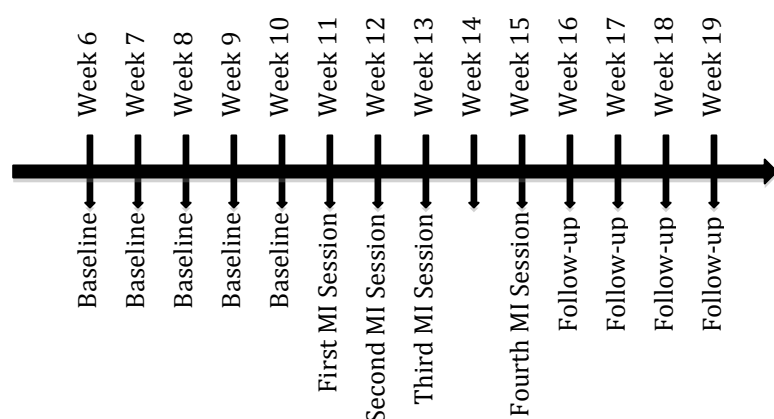


Figure 6: Timeline of Case 3's participation in the study

5.1.4 Case 4. During the entire study Case 4 lived with her parents in a home that was smoke-free indoors and included other smokers. She was allowed to smoke outside at home. She was single at baseline and in a relationship with a non-smoker for the remainder of the study. During the study she did not live with her partner and most of her close friends were smokers. Figure 6 displays the timeline of Case 4's participation in the study. She completed three MI sessions.

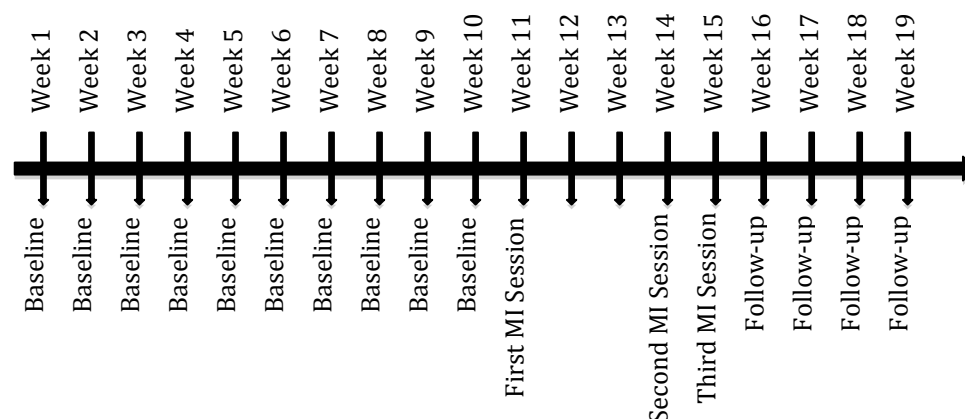


Figure 7: Timeline of Case 4's participation in the study

5.1.5 Case 5. During the entire study Case 5 rented with smokers in a home that was smoke-free indoors, with the exception of baseline when the home was not smoke-free. Case 5 was only in a relationship at post-intervention when she was living with her partner who smoked. During the study she was allowed to smoke at home and most of her close friends were smokers. Case 5 experienced a miscarriage when she was five-six weeks pregnant, 52 days after the three-month follow-up. Figure 7 displays the timeline of Case 5's participation in the study. She completed two MI sessions.

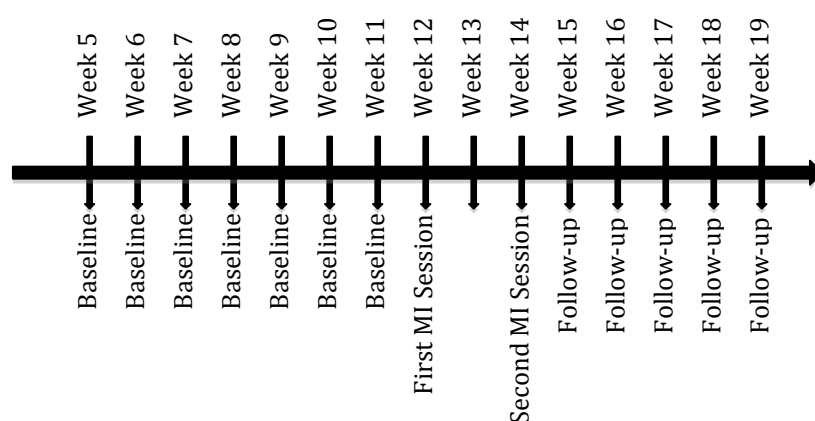


Figure 8: Timeline of Case 5's participation in the study

5.1.6 Case 6: For the entire study Case 6 lived in a home that was smoke-free indoors with her parents, who also smoked, apart from during baseline when she lived in a rented home that was smoke-free indoors with other smokers. During the entire study she was single, most of her close friends were smokers, and she was allowed to smoke outside at home. Figure 8 displays the timeline of Case 6's participation in the study. She completed one MI session.

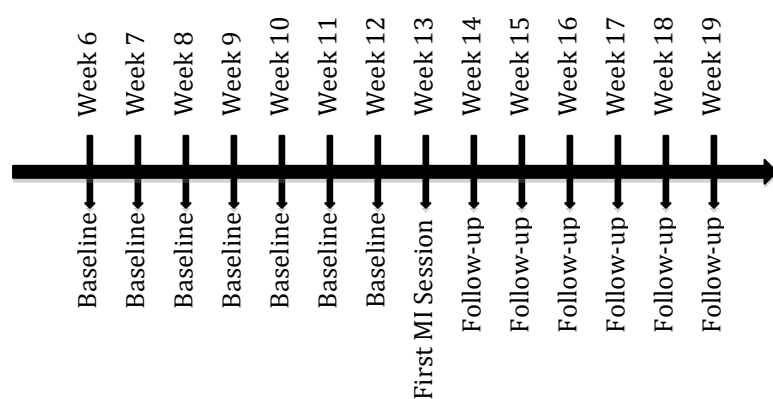


Figure 9: Timeline of Case 6's participation in the study

5.1.7 Case 7: At baseline and post-intervention Case 7 lived in a rented home that was smoke-free indoors with her partner who smoked. However, during both the three and six-month follow-ups Case 7 was single and living with her parents in a home that was smoke-free indoors where no one apart from her smoked. During the entire study she was allowed to smoke outside at home and most of her close friends were smokers. Figure 9 displays the timeline of Case 7's participation in the study. She completed three MI sessions.

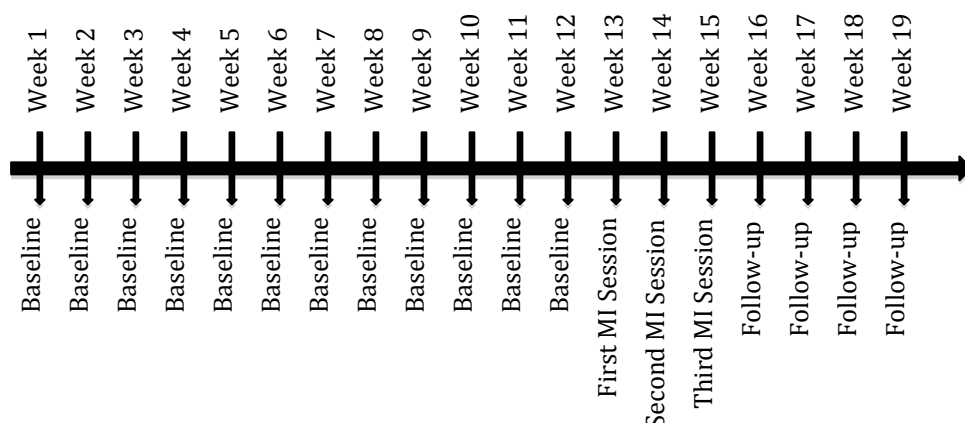


Figure 10: Timeline of Case 7's participation in the study

5.2 Participants' Smoking Behaviour

Throughout the study participants were asked, via the questionnaires, whether they would be interested in joining a stop smoking support group. However, no participants reported that they would like to join during the study.

All participants, except Case 5, perceived themselves as current smokers throughout the entire study. Case 5 was the only participant who said she had quit smoking during the study (at the six-month follow-up). The NZ MoH defines 'current smoker' as someone who has consumed over 100 cigarettes in their lifetime and smokes at least monthly (MoH, 2008). Thus, all participants, including Case 5, met the NZ MoH criteria for 'current smoker' during the entire study, firstly, because each participant was smoking tobacco on a weekly basis for at least a year prior to the study's commencement (Table 4) and secondly, because all participants had smoked in the past month at baseline, post-intervention and the three and six-month follow-ups (Table 6). Case 5 still met the NZ MoH criteria for 'current smoker' because she had only just quit at six-months follow-up and therefore not yet been abstinent for an entire month.

Table 4

Tobacco Use History (Age)

Participant	Initial Use	Started Regular Use (Weekly)
Case 1	16	17
Case 2	14	18
Case 3	12	14
Case 4	9	13
Case 5	9	12
Case 6	13	15
Case 7	15	16
Mean (Standard Deviation [SD])	12.57 (2.76)	15 (2.16)

5.2.1 Quit Attempts: Prior to the commencement of the study, all participants, except Case 1, had tried to quit smoking (Table 5). Cases 3 and 4 increased their number of quit attempts throughout the study, however the number of quit attempts made by Case 6 remained the same. All other cases (1, 2, 5 and 7) displayed self-report errors because at some point during the study the participant reported their overall number of quit attempts as lower than what they had previously reported. Therefore no conclusions on quit attempts can be drawn for these cases.

Likewise, self-report errors were evident in all participant reports on their longest period smoke-free, except Case 4 who consistently reported the same period throughout the study. This is because at some point during the study participants had reported their longest smoke-free period as shorter than they had previously reported. For instance, Case 1 reported

that her longest smoke-free period at post-intervention was one day however at three-months follow-up her longest smoke free period was two-three hours, less than at post-intervention. Thus, variability on self-reports in this measure makes the interpretation unreliable and as a result no conclusions can be drawn from this data for most cases. As a result this data is excluded from the analysis from here on. Therefore the mean and standard deviation in Table 5 is only calculated for quit attempts.

Table 5

Participant Quit Attempts (Longest Period Smoke-Free on Best Attempt)

	Baseline	Post-intervention	3-month F/up	6-month F/up
Case 1	0 (0)	1 (1Day)	2-3 (2-3hours)	1 (1Day)
Case 2	4 (5days)	2 (4days)	3 (2-3weeks)	3 (2-3weeks)
Case 3	3 (4days)	3 (1week)	4 (1week)	7 (5days)
Case 4	2 (1year 6months)	4 (1year 6months)	4-5 (1year 6months)	5 (1year 6months)
Case 5	10 (9months)	1 (10months)	5 (9months)	5 (12month)
Case 6	2 (2days)	2 (1day)	2 (4days)	2 (3days)
Case 7	2 (2years)	2 (1year 2months)	4 (3weeks)	3 (1year 6months)
Mean (SD)	3.29 (3.20)	2.14 (1.07)	3.57 (1.10)	3.71 (2.06)
F/up: Follow-up				

5.2.2 Frequency of Participant Smoking: While there was little change to the number of days during the study on which most participants reported smoking, there were marked reductions in the number of days smoked for both Cases 5 and 7 at the six-month follow-up compared to baseline, post-intervention and three-month follow-up (Table 6). Overall, the mean number of days participants smoked in the past 30 had a downward trend throughout the study.

Table 6

Number of Days a Participant has Smoked in the Past 30.

Participant	Baseline	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	30	30	30	30
Case 2	30	30	30	30
Case 3	30	30	30	26
Case 4	30	30	30	30
Case 5	30	30	20	6
Case 6	30	30	30	30
Case 7	26	24	30	7
Mean (SD)	29.43 (1.51)	29.14 (2.27)	28.57 (3.78)	22.71 (11.18)

Similarly, CO levels indicated no consistent trends in participant smoking during the study (Figure 11) and when overall means for participant CO levels were calculated there were no notable changes throughout the study (Table 7). However, several cases displayed reductions in smoking either during or after intervention. For instance, Case 1 appeared to trend downwards during the intervention, however returned to a level similar to baseline at

post-intervention and follow-up. Case 2 had four CO measurements that were lower than baseline during intervention, post-intervention and follow-up. Likewise, Case 3 had two CO measurements that were below baseline levels at post-intervention as well as a further decrease in CO levels at the six-month follow-up and Case 4 had one spike in CO levels at baseline, which did not occur again. Conversely, Case 6 appeared to have an upward trend suggesting that her smoking throughout the study increased, while Cases 5 and 7 displayed CO levels that appeared to remain unchanged. However, Case 5 had a CO levels measure of 0-6ppm at six-months follow-up, consistent with her report of quitting smoking at this time.

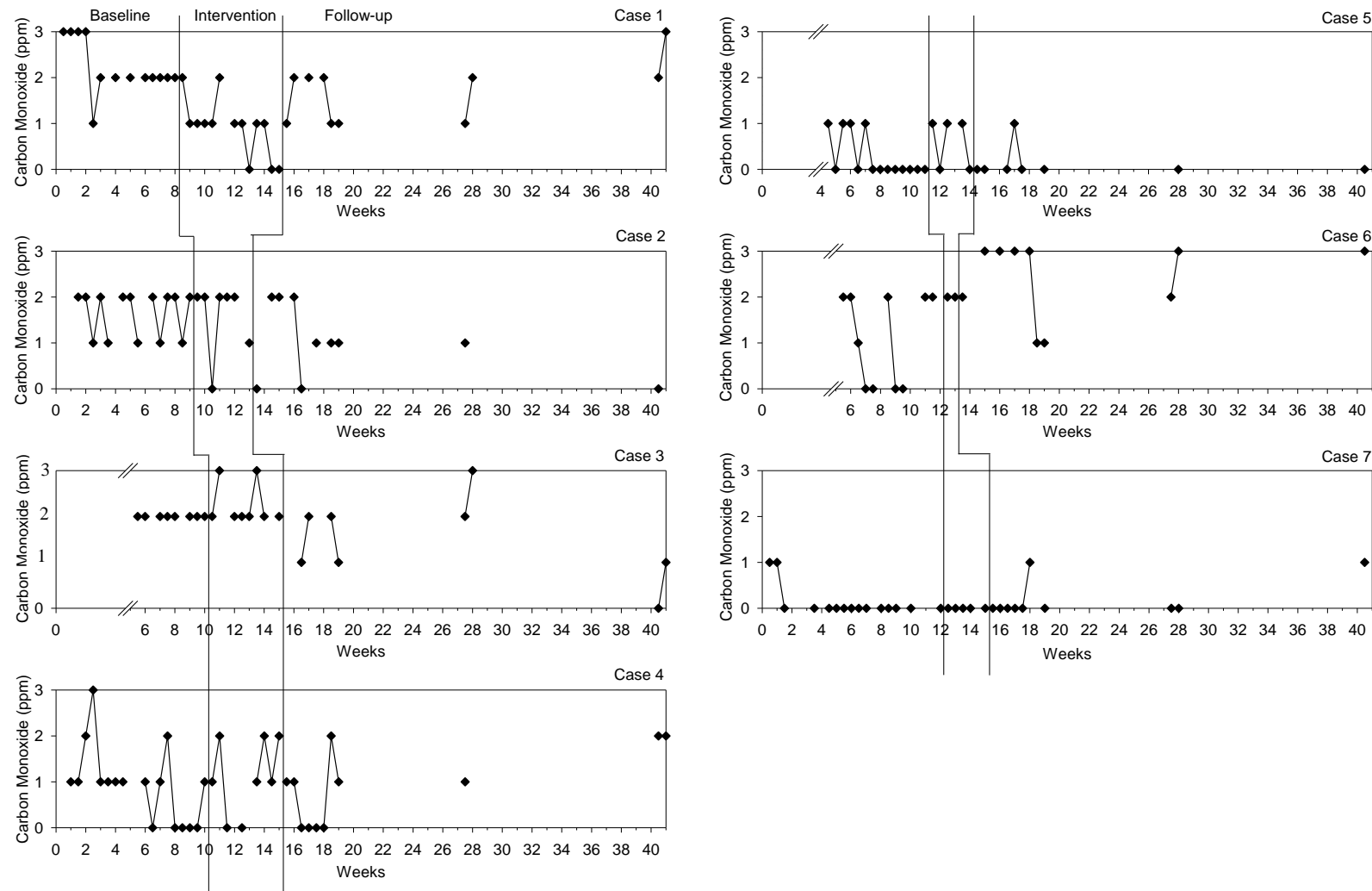


Figure 11: Carbon Monoxide in the Expired Breath of Each Participant (measurements taken twice every week)

Table 7

Mean (SD) Participant CO levels in Expired Breath (Data from Figure 11)

Participant	Baseline	Intervention	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	2.23 (0.6)	0.92 (0.64)	1.33 (0.82)	1.5 (0.71)	2.5 (0.71)
Case 2	1.64 (0.5)	1.57 (0.79)	1.13 (0.83)	1	0
Case 3	2 (0)	2.25 (0.46)	1.5 (0.58)	2.5 (0.71)	0.5 (0.71)
Case 4	0.94 (0.83)	1.13 (0.83)	0.63 (0.74)	1	2 (0)
Case 5	0.29 (0.47)	0.6 (0.55)	1.67 (0.41)	0	0
Case 6	1.1 (0.99)	2 (0)	2.29 (0.95)	2.5 (0.71)	3
Case 7	0.13 (0.35)	0 (0)	0.14 (0.38)	0 (0)	1
Mean (SD)	1.19 (0.81)	1.21 (0.79)	1.24 (0.70)	1.21 (1.04)	1.29 (1.22)

Likewise, there appear to be no consistent trends throughout the study for the number of cigarettes smoked per week for most cases (Figure 12). However, the mean number of cigarettes smoked by all participants had a downward trend throughout the study (Table 8). Individually, several participants reported reductions in the number of cigarettes they smoked weekly. Case 6 reported a reduction in the number of cigarettes she smoked post-intervention compared to baseline. This, however, was inconsistent with her increased CO levels at post-intervention. Cases 1, 2, 3, and 6 reported smoking less at follow-up compared to baseline. This was only consistent with the CO levels measured at 6-months follow-up for Cases 2 and 3. Case 1 reported two spikes in the number of cigarettes smoked at baseline, which did not occur during intervention but spiked again at post-intervention. This was consistent with Case 1's reduction in CO levels during intervention. The number of cigarettes smoked per week by Cases 4 and 7 appears to have remained unchanged, similar to their recorded CO levels, except for a small spike at the beginning of baseline for Case 7. For Case 5 the weekly number of cigarettes reportedly smoked appears to have increased post-intervention, yet her CO levels at post-intervention appear unchanged. However, her report of zero cigarettes smoked at six-months follow-up was consistent with her report of being quitting at this time.

Table 8

Mean (SD) Number of Cigarettes Smoked Weekly by Participants (Data from Figure 12)

Participant	Baseline	Intervention	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	50 (15)	43 (4.83)	45 (17.11)	28	28
Case 2	50 (2.45)	44.5 (5.45)	42 (8.08)	34	35
Case 3	69.4 (5.86)	61 (15.49)	56.67 (14.19)	59	17
Case 4	35.33 (4.58)	36.67 (12.34)	36.5 (4.12)	38	37
Case 5	20.43 (9.38)	29.5 (0.71)	38.75 (7.23)	28	0
Case 6	107.5 (15.33)	99	73.6 (21.9)	73	77
Case 7	21.44 (9.7)	11.33 (3.79)	18.5 (5.26)	8	21
Mean (SD)	50.59 (30.51)	46.43 (27.70)	44.43 (17.2)	38.29 (21.53)	30.71 (23.92)

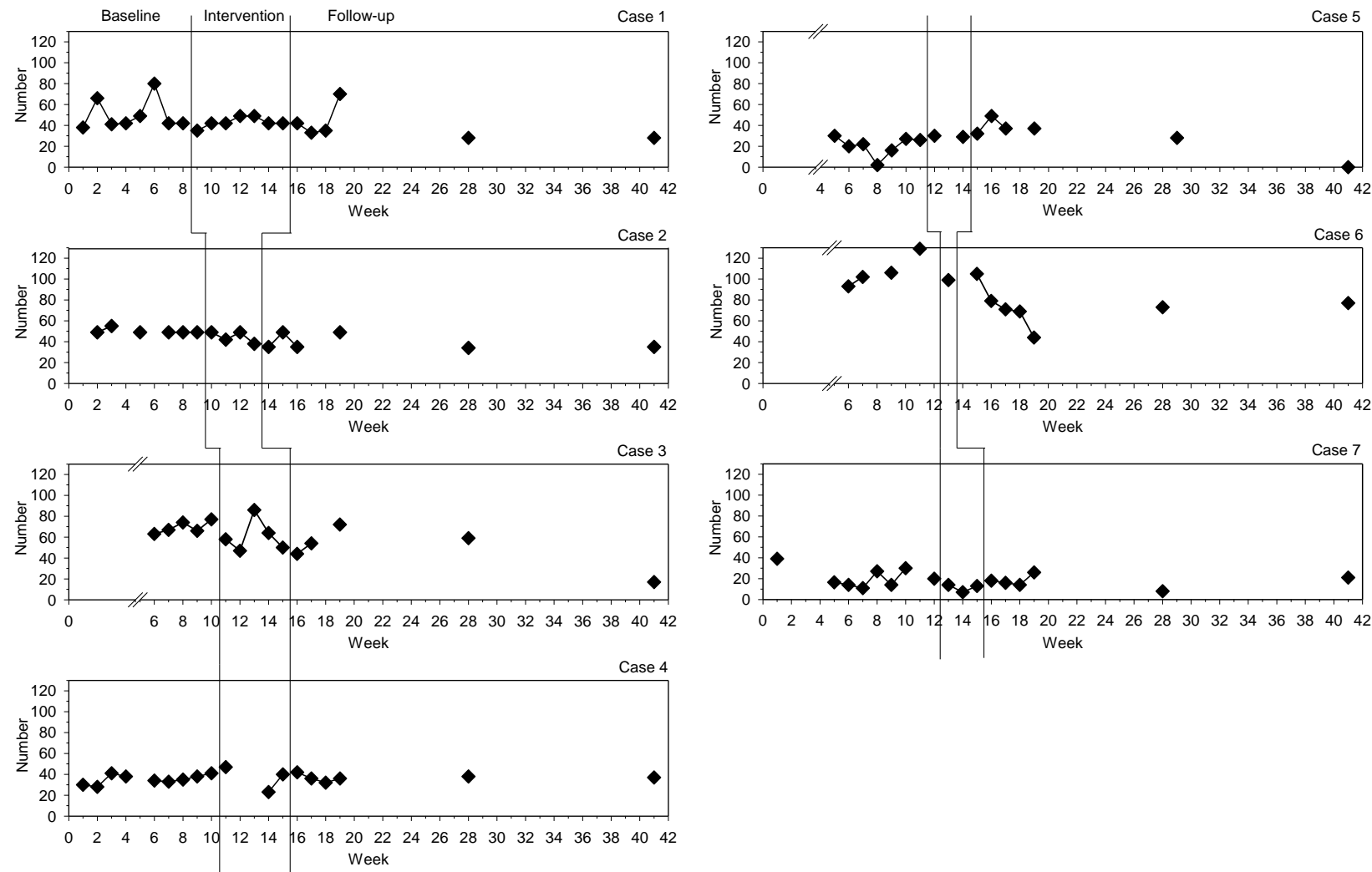


Figure 12: Number of Cigarettes Smoked Weekly by Participants

(Note: Number of cigarettes smoked each week was recorded as the sum of the number of cigarettes smoked daily over the last seven days.)

Table 9 shows the number of cigarettes smoked on both week and weekend days during the study. The measure is similar to the measure discussed above on the number of cigarettes smoked weekly by participants (Figure 12, Table 8). Therefore consistency on these self-reports provides reliability. For instance, similar to Table 8, the total mean number of cigarettes smoked on week and weekend days by all participants also had a downward trend throughout the study, except for the weekend day mean at three-months follow-up being slightly higher than at post-intervention (Table 9). In addition, Case 1, 4 and 7's self-reported data on the number of cigarettes smoked weekly (Figure 12) were approximately consistent with their self-reported number of cigarettes smoked per weekend and weekdays (Table 9). Data between these two measures is also approximately consistent for Cases 2 and 3 except for their self-report at the three-month follow-up. Furthermore, Cases 5 and 6 self-report data that was inconsistent (Figure 12, Table 9). However, Case 5's self-report at six-months follow-up were consistent on both measures - she reported having not smoked on both measures (Figure 12, Table 9).

All participants, except Case 4 at baseline and Case 7 at post-intervention, reported smoking either the same amount or more cigarettes on weekend-days compared to weekdays (Table 9) throughout the study.

Table 9

Number of Cigarettes Smoked per Weekday and Weekend-Day

Participant	Baseline		Post Intervention		3-Month F/up		6-Month F/up	
	Week	Weekend	Week	Weekend	Week	Weekend	Week	Weekend
Case 1	5-8	5-8	5-6	5-6	4	5	4	4
Case 2	8	8-10	5	5-7	5	10	5	5
Case 3	8-10	10+	5	5	8	11	3	5
Case 4	4	3	5-10	8-10	5	5	5-6	5-6
Case 5	5	10	5	8	3	5	0	0
Case 6	12	15	10	15	10	20	10	15
Case 7	5	6	2.5	2	1	4	3	3
Mean (SD)	7.07 (2.81)	8.5 (3.82)	5.79 (2.36)	7.21 (4.1)	5.14 (3.02)	8.57 (5.74)	4.36 (3.06)	5.36 (4.64)

5.3 Nicotine Dependence

During the entire study four participants (Cases 1, 2, 3 and 6) reported smoking because they found it difficult to quit. Since they had begun smoking all participants (except Case 4) consistently reported experiencing strong cravings to smoke and feeling like they really needed a cigarette.

All participants were waiting 10-60 minutes longer to have their first cigarette of the day post-intervention ($M = 81.43$, $SD = 59.28$) compared to baseline ($M = 70.71$, $SD = 70.38$), except Case 7 who reported a marked decrease in the time before her first cigarette (Table 10). Cases 1, 2 and 5 maintained the delay in smoking at the three-month follow-up, and Case 7 reported a marked increase in the time before her first cigarette, however this was not maintained at six-month follow-up. The remaining three cases (Cases 3, 4 and 6) decreased the time between waking and their first cigarette by 15-70 minutes at three-month follow-up, although for Case 6 this was still 10 minutes longer than baseline and was maintained at six-month follow-up. Three participants (Cases 1-3) reported having further increased the time before their first cigarette at six-month follow-up by 30-90 minutes, Case 5 had quit and Case 4 maintained the improvements achieved post-intervention at six-month follow-up.

Table 10

Number of Minutes after Waking in the Morning Till Each Participant Has their First Cigarette

Participant	Baseline	Post Intervention	3-Month	6-Month
Case 1	20	30	30	60
Case 2	30	60	60	150
Case 3	30	60	10-20	120
Case 4	90	150	80	150
Case 5	120	180	180	Quit
Case 6	5	30	15	15
Case 7	200	60	390	90
Mean (SD)	70.71 (70.38)	81.43 (59.28)	110 (136.11)	97.5 (53.46)

5.3.1 Participant Withdrawal Symptoms: Each week participants reported on whether they felt a certain withdrawal symptom and rated the strength of that symptom over the past seven days. Figure 13 displays both the total weekly number of withdrawal symptoms reported by each participant and their combined average strength. Data suggests a downward trend for several participants in the number and average strength of withdrawal symptoms experienced (Cases 1, 2 and 7) and a downward trend in the number of withdrawal symptoms post-intervention for Case 6. Cases 1 and 2, however, were already trending downward at baseline to a floor effect thereafter and Case 7 did not maintain the downward trend during post-intervention. For Cases 3 and 5 the average strength of withdrawal symptoms was higher at follow-up compared to baseline. However, the data needs to be

treated with caution because of the large variability but the downward trend in withdrawal symptoms suggests that participants had not reduced their smoking.

The overall mean number of participant reported withdrawal symptoms and there combined average strength decreased during intervention and post-intervention, however increased at follow-up (Table 11 and 12). This supports the mean reductions in participant smoking at follow-up (Table 8 and 9).

Withdrawal symptoms were used as an alternative measure for smoking cessation and reductions in participant smoking. Only Case 5 quit smoking (at six-months follow-up). At this time she reported a higher average strength of withdrawal symptoms than at baseline, which would be consistent with not smoking, however, the number of reported withdrawal symptoms did not increase from baseline.

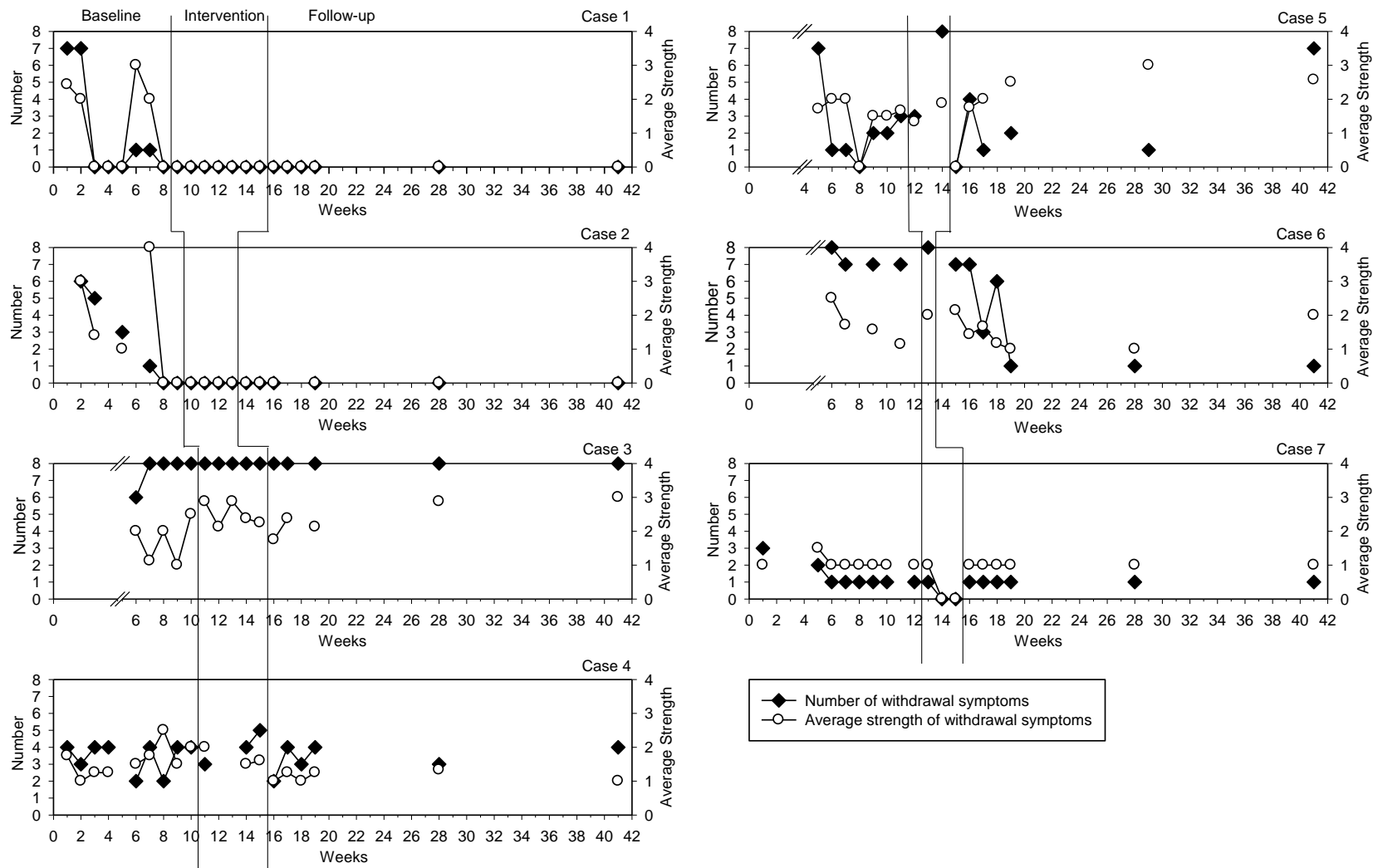


Figure 13: The Number and Average Strength of Withdrawal Symptoms Experienced Weekly by Participants

(Note: Weekly measurements represent the withdrawal symptoms experienced over the previous seven days)

Table 11

Mean (SD) Number of Withdrawal Symptoms Experienced by Participants (Data from Figure 13)

Participant	Baseline	Intervention	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	2 (3.12)	0 (0)	0 (0)	0	0
Case 2	2.5 (2.59)	0 (0)	0 (0)	0	0
Case 3	7.6 (8.9)	8 (0)	8 (0)	8	8
Case 4	3.44 (0.88)	4 (1)	3.25 (0.96)	3	4
Case 5	2.29 (2.29)	5.5 (3.54)	1.75 (1.71)	1	7
Case 6	7.25 (0.5)	8	4.8 (2.68)	1	1
Case 7	1.38 (0.74)	0.33 (0.58)	1 (0)	1	1
Mean (SD)	3.78 (2.57)	3.69 (3.63)	2.69 (2.92)	2 (2.83)	3 (3.37)

Table 12

Mean (SD) Average Strength of Withdrawal Symptoms Experienced by Participants (Data from Figure 13).

Participant	Baseline	Intervention	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	1.18 (1.3)	0 (0)	0 (0)	0	0
Case 2	1.57 (1.63)	0 (0)	0 (0)	0	0
Case 3	1.73 (0.64)	2.5 (0.35)	2.08 (0.31)	2.88	3
Case 4	1.61 (0.45)	1.7 (0.26)	1.13 (0.14)	1.33	1
Case 5	1.48 (0.69)	1.6 (0.38)	1.56 (1.09)	3	2.57
Case 6	1.73 (0.57)	2	1.6 (0.41)	1	2
Case 7	1.06 (0.18)	0.33 (0.58)	1 (0)	1	1
Mean (SD)	1.48 (0.26)	1.16 (1.03)	1.05 (0.8)	1.32 (1.22)	1.37 (1.19)

5.4 Desire to Quit Smoking

The main reasons participants gave for smoking was to help them feel relaxed/calm, think/concentrate and give them something to do. At the same time, all participants gave reasons for wanting to quit smoking. The most common reasons for wanting to quit were health and financial reasons (all participants), and their children (six participants). Other reasons given for wanting to quit were: the bad taste/smell (three participants); image (two participants); and their families and career choices (both one participant each).

5.4.1 Quit plans: At baseline all participants were thinking of quitting in the next six months, except Case 3, who wanted to cut down, and Case 6, who didn't want to change her smoking. Changes occurred for Case 3 post-intervention and Case 6 at the three-month follow-up, when they both shifted to wanting to quit within the next six months for the remainder of the study, suggesting an increased desire to quit smoking. By the six-month follow-up all participants, except Cases 4 and 5, were thinking of quitting within at least the next six months. Case 5 had quit and Case 4 had changed from wanting to quit at baseline to wanting to cut down at post-intervention and both the three and six-month follow-ups.

Case 5 was the only participant to identify herself at baseline as being helpful to her in quitting; all other cases considered that other people would be of help (e.g. friends, family, partner, and their children). Two cases at post-intervention (Case 6 and 7) saw the young parents' college as being helpful to them in quitting. However, at follow-up there appeared to be a shift with more cases (Cases 1, 2, 3 and 6) reporting that they considered themselves too as being helpful, suggesting increased self-efficacy to quit smoking.

Table 13

Who Participants Thought Helpful to Them in Quitting Smoking

Participant	Baseline	Post Intervention	3-Month F/up	6-Month F/up
Case 1	Boyfriend	No one	No one	No one
Case 2	Friends	Friends	Friends	No one
Case 3	Family	Herself	Friends/family	Herself
Case 4	Ex-partner	Partner	Partner	Partner
Case 5	Herself	Friends	Herself	Herself
Case 6	Son	School	Herself	No one
Case 7	Parents	Mother/school	Daughter	Family

5.4.2 Importance of quitting: The perceived importance of quitting smoking by participants showed no trend throughout the study (all Cases; Figure 14). However, most participants (Cases 1,2,3,4, and 7) already had high levels of perceived importance at baseline ($M = 6.96$, $SD = 1.97$; Table 14). The only noticeable change was at six-months follow-up for Case 1 who rated the importance of quitting lower and Case 5 who rated the importance of quitting as higher.

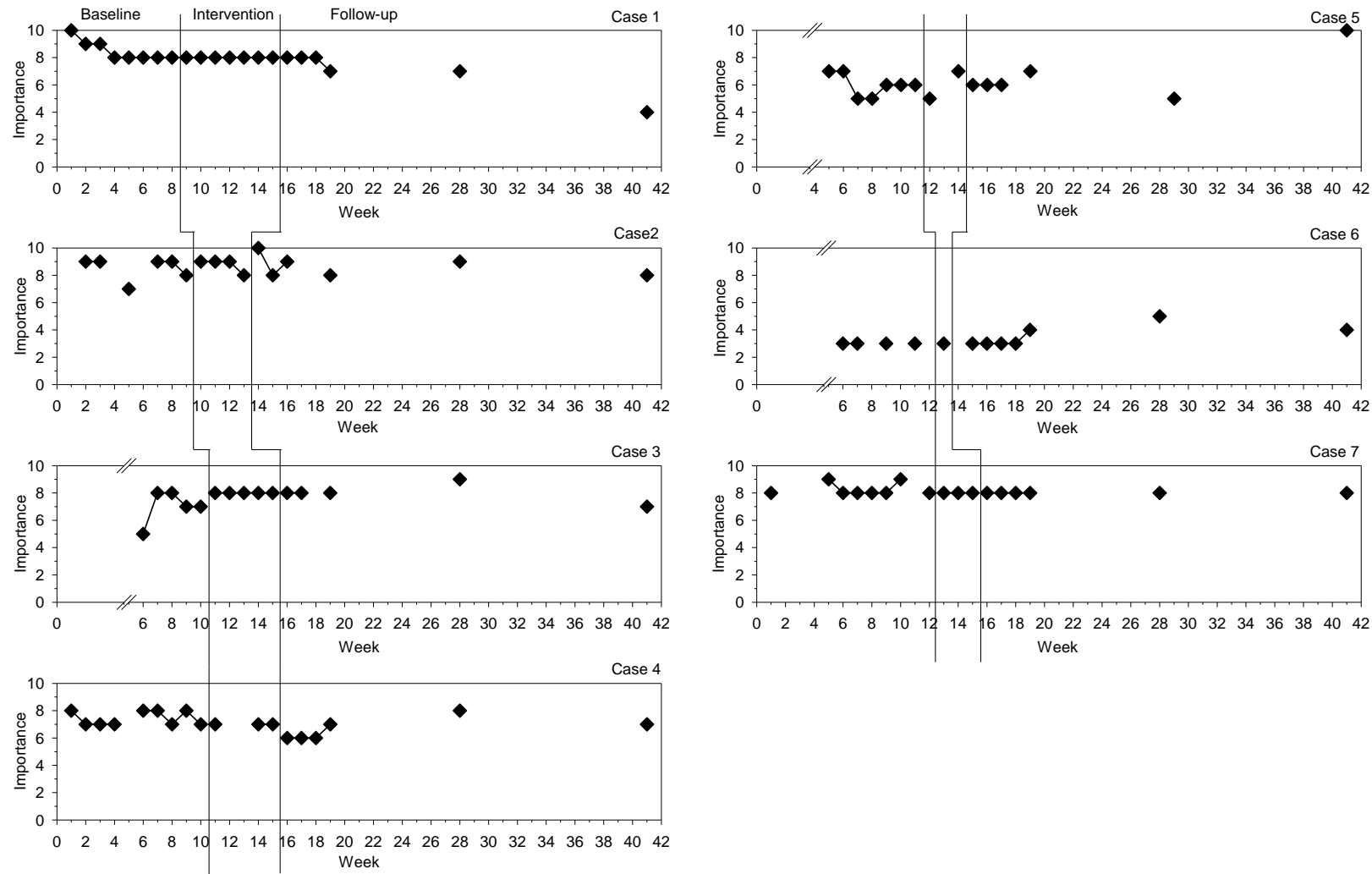


Figure 14: Participant Perceived Importance of Quitting Smoking, Measured Weekly, on a Scale from Zero to Ten

(Note: Zero indicates that it is not at all important to the participants to quit whereas ten represents it is extremely important)

Table 14:

Mean (SD) Participant Perceived Importance of Quitting Smoking (Data from Figure 14)

Participant	Baseline	Intervention	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	8.5 (0.76)	8 (0)	7.75 (0.5)	7	4
Case 2	8.5 (0.84)	8.75 (0.5)	8.75 (0.96)	9	8
Case 3	7 (1.22)	8 (0)	8 (0)	9	7
Case 4	7.44 (0.53)	7 (0)	6.25 (0.5)	8	7
Case 5	6 (0.82)	6 (1.41)	6.25 (0.5)	5	10
Case 6	3 (0)	3	3.2 (0.45)	5	4
Case 7	8.25 (0.46)	8 (0)	8 (0)	8	8
Mean (SD)	6.96 (1.97)	6.96 (1.96)	6.89 (1.88)	7.29 (1.70)	6.86 (2.19)

5.4.3 Confidence to Quit: Similarly, in most Cases, no trends were apparent in participant perceived confidence in their ability to quit smoking (Cases 1,2,4,5 and 7), although there were some increases during follow-up (Cases 3 and 6; Figure 15). Case 2 had a dip in perceived confidence at the three-month follow-up, Case 5's confidence increased markedly at the six-month follow-up, and Case 4 appears to have had lower confidence at follow-up compared to baseline. Overall, mean participant scores for perceived importance and confidence to quit smoking did not alter much throughout the study; however mean importance scores were slightly higher than mean confidence scores (Table 14 and 15).

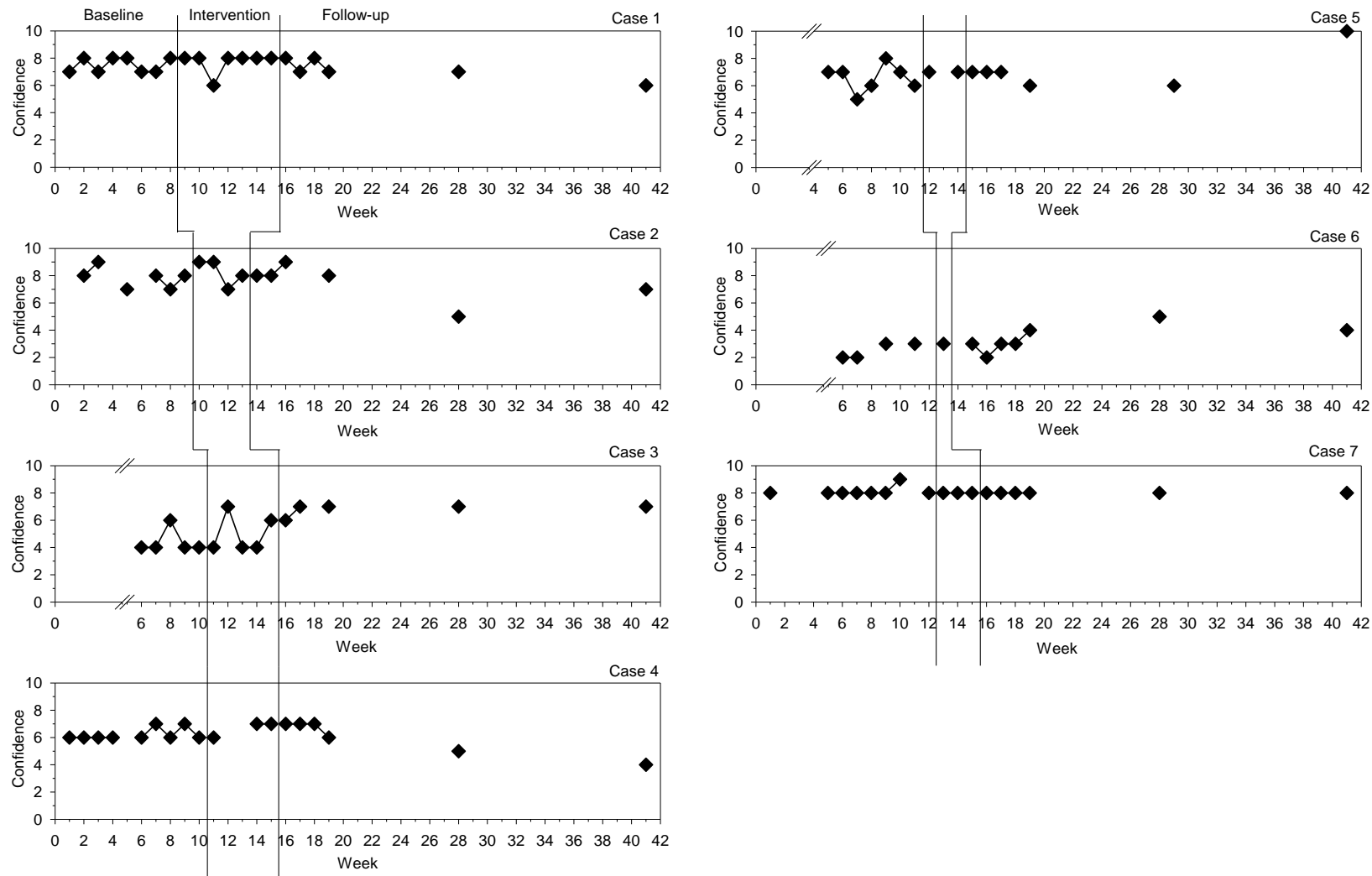


Figure 15: Participant Perceived Confidence on their Ability to Quit Smoking, Measured Weekly, on a Scale from Zero to Ten

(Note: Zero indicates that the participant is not at all confident in their ability to quit whereas ten represents they are extremely confident)

Table 15

Mean (Standard Deviation) Participant Perceived Confidence on their Ability to Quit Smoking (Data from Figure 15)

Participant	Baseline	Intervention	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	7.5 (0.53)	7.71 (0.76)	7.5 (0.58)	7	6
Case 2	7.83 (0.75)	8.25 (0.96)	8.33 (0.58)	5	7
Case 3	4.4 (0.89)	5 (1.41)	6.67 (0.58)	7	7
Case 4	6.22 (0.44)	6.67 (0.58)	6.75 (0.5)	5	4
Case 5	6.57 (0.98)	7 (0)	6.75 (0.5)	6	10
Case 6	2.5 (0.58)	3	3 (0.71)	5	4
Case 7	8.13 (0.35)	8 (0)	8 (0)	8	8
Mean (SD)	6.16 (2.05)	6.52 (1.9)	6.71 (1.76)	6.14 (1.21)	6.57 (2.15)

5.4.4 Motivation to Quit: The participants' perceived motivation to quit smoking did not show any trends across participants (Figure 16). Mean participant scores for motivation increased slightly at intervention and post-intervention but dropped at follow-up (Table 16). Cases 1 and 3's motivation appears to have been trending upwards during intervention. For Case 3 this remained stable thereafter except for a dip at the three-month follow-up. Case 1 however, returned to baseline levels at post-intervention and throughout follow-up. Case 6 reported an increase in motivation to quit post-intervention, whilst Case 5's motivation to quit was highest at six-months follow-up.

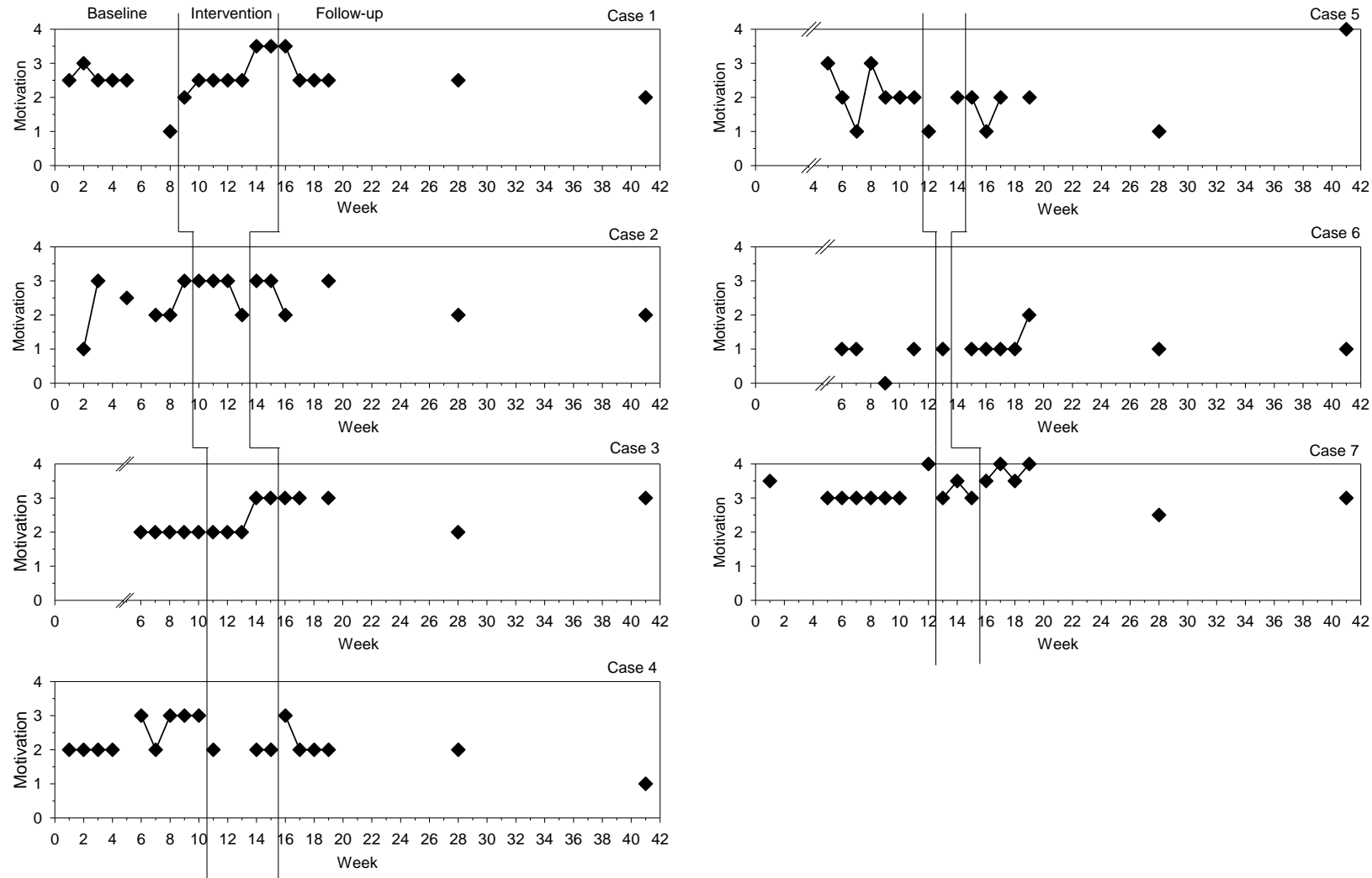


Figure 16: Participant Perceived Motivation on their Ability to Quit Smoking, Measured Weekly, on a Scale from Zero to Four (Note: Zero indicates that the participant is not at all motivated whereas four represents extremely motivated)

Table 16

Mean (SD) Participant Perceived Motivation on their Ability to Quit Smoking (Data from Figure 16).

Participant	Baseline	Intervention	Post-Intervention	3-Month F/up	6-Month F/up
Case 1	2.33 (0.68)	2.71 (0.57)	2.75 (0.5)	2.5	2
Case 2	2.25 (0.76)	2.75 (0.5)	2.75 (0.5)	2	2
Case 3	2 (0)	2.4 (0.55)	3 (0)	2	3
Case 4	2.44 (0.53)	2 (0)	2.25 (0.5)	2	1
Case 5	2.14 (0.69)	1.5 (0.71)	1.75 (0.5)	1	4
Case 6	0.75 (0.5)	1	1.2 (0.45)	1	1
Case 7	3.19 (0.37)	3.17 (0.29)	3.75 (0.29)	2.5	3
Mean (SD)	2.16 (0.73)	2.22 (0.76)	2.49 (0.84)	1.86 (0.63)	2.29 (1.11)

6. Discussion

6.1 Summary of Main Findings

The participants in this study comprised the most challenging group of pregnant youth and young mothers who smoke because they were students who had already resisted repeated offers of cessation support and were struggling with the smoke-free school environment. The present study evaluated the effect of MI with these students aimed at increasing their motivation to stop smoking and engage with smoking cessation support services. Throughout the study, however, not one participant indicated an interest in joining a quit smoking support group, although most participants were thinking about quitting in the next six months at baseline. Furthermore, the two participants, who weren't considering quitting at baseline, were at follow-up considering quitting.

What's more, one participant went from wanting to quit in the next six months at baseline to reporting having quit at six-months follow-up. The participant's self-report of being quit was confirmed biochemically by measuring the CO level in her expired breath. When she quit her importance, confidence and motivation to quit smoking were the highest they had been throughout the study. However, another participant who wanted to quit in the next six months at baseline, only wanted to cut down from post-intervention onwards, although this participant and another had increased their quit attempts throughout the study.

In addition, as predicted, several cases exhibited CO levels and weekly cigarette consumptions that illustrated reductions in their smoking quantity and frequency either during intervention or follow-up. Two of the participants who reported reductions in their

smoking at follow-up also reported a greater confidence in their ability to quit at this time compared to baseline. Overall, while the participants' perceived importance to quit smoking was high throughout the study their confidence in their perceived ability to quit was slightly lower.

Moreover, all participants were waiting longer at post-intervention to have their first cigarette of the day and some were waiting even longer at follow-up. Haberstick et al., (2007) found that the urgency to smoke after waking was the best index to measure nicotine dependence, suggesting that all participants experienced a decrease in dependence following MI. Similarly, Bradley (2012) found that an MI intervention implemented in the school setting reduced symptoms of nicotine dependence for adolescent smokers.

It is important to note the challenging environments in which the participants lived: all had close friends who smoked and nearly all lived with smokers throughout the study. Adolescents living in these environments experience additional barriers to smoking cessation as their association with others who smoke reinforces their own smoking behaviour (Kobus, 2003). All participants, however, kept their homes smoke-free.

Overall, results from the present study indicate that MI might be useful as an aid to smoking reduction, desire to quit, quit attempts and cessation for some individuals. However, MI did not influence participant motivation to join a quit group. Furthermore, the majority of participants experienced no consistent trends in their quit attempts, longest smoke free period, CO levels, frequency and quantity of cigarettes smoked and their desire, importance, confidence and motivation to quit.

6.2 Methodological Considerations, Study Strengths and Limitations

This study makes a small but positive contribution towards both the NZ Government's goal for the nation to be essentially smoke-free by 2025 (The New Zealand Government, 2011) and the Tobacco Control Research Tūranga goal of carrying out innovative research leading to halving smoking prevalence by 2020. In addition, the single-case design of the present study allowed for a detailed investigation of each participant. It provides a different, more in depth, approach to the randomised controlled trials (RCT) most often employed in this area of research (Hayes et al., 2013; Stotts, DiClemente & Dolan-Mullen, 2002; Stotts et al., 2004; Stotts, et al., 2009). For instance, RCTs provide information from group-based research by averaging over individuals, which poses difficulties when trying to apply the findings to highly variable individual cases (Blampied, 2013). Furthermore, RCTs can confuse clinical significance with statistical significance, which is influenced by sample size, such that the larger a sample size, the smaller a change needs to be to reach significance. This means that a statistically significant result may not be particularly effective in practice. In contrast, single-case research focuses on clinical significance, which requires a substantial change at the individual level. Thus, a single-case design offers findings at the individual level that are rich, unique and invaluable, essential for matching effective treatments to individuals.

An additional strength for this study was that all participants were retained for follow-up data and completed at least one MI intervention session with a high level of intervention acceptance and adherence. However, three out 10 participants were excluded from the study before the intervention period commenced due to high levels of school absences. The main difference between those who were excluded from the study and those who remained was

education level. The lower education level of those excluded may also have been a consequence of limited school attendance.

Furthermore, the present study used a CO monitor that was calibrated regularly throughout the study as biochemical confirmation of participant self-reports for smoking cessation and reductions, and therefore provides a more reliable measure of smoking than self-report. Additionally, all participants were asked to provide at least two readings each time CO levels were recorded to obtain an accurate measurement. It was important in this cohort to use a biochemical tests to verify self-reports. Firstly, because pregnant women often give misinformation regarding their smoking due to the negative social pressure around smoking during pregnancy (Karatay et. al., 2013) and secondly because adolescents can provide false information regarding their absence from smoking (Colby et al., 2005).

It must be acknowledged that there are some limitations in the present study. For instance, the reliance on the self-report and retrospective data may have influenced the study's results. The questionnaires required participants to recall how much they had smoked over different periods of time, their previous quit attempts, longest smoke-free period and their withdrawal symptoms. As a result participants may have under-estimated or over-estimated their answers to these questions. An instance where the researcher recognised over-estimated reports on smoking was when one participant (Case 7) told the researcher that she had sometimes been smoking half a cigarette and reporting it as a whole cigarette.

In addition, adolescents are more likely to under-estimate their smoking behaviours compared to adults for reasons such as legalities and parental sanctions on smoking (Mermelstein et al., 2002). In contrast, adolescents may over estimate their smoking by

exaggerating as a means to gain social reinforcement from peers. Besides these factors, compared to adult smokers, adolescent smokers have more variable smoking patterns and are more likely to be sporadic or non-daily smokers, thus trying to recall exact amounts is more difficult than for frequent smokers. Therefore, in an attempt to minimise recall errors the weekly questionnaire asked how many cigarettes were smoked each day during the past week instead of requesting a total. Perhaps the use of a daily self-monitoring diary for recording the number of cigarettes smoked could have eliminated recall bias on this measure.

Nevertheless, there were some noticeable self-report errors: for instance, participants were reporting quantities for quit attempts and longest period smoke-free that were less than they had previously stated. The reason for this could be either that the participant found it difficult to remember (recall bias) or the participant did not understand the question correctly. Therefore, perhaps the questionnaire needed to be explained to participants verbally or worded in such a way that was more clear and informative.

Further, self-report errors are possible in the withdrawal symptoms reported by two participants (Case 1 and 2). The withdrawal symptoms reported by these participants displayed a downward trend during baseline, followed by reports of zero symptoms thereafter. Zero withdrawal symptoms suggest participants made no alterations to their smoking. However, both participants had reduced their smoking at some point after baseline, suggesting withdrawal symptoms should have been present. Therefore perhaps these participants had got tired of completing the weekly questionnaire and as a result circled zero, the same answer, to every withdrawal question. To better identify such errors the study could have reverse coded items; reverse coded items are phrased in the semantically opposite direction. Otherwise, maybe making future questionnaires shorter or delivering the

questionnaire in an application on mobile phones could increase participant focus and concentration.

Another possible incidence of self-report error for one participant (Case 6) is indicated by conflicting trends, such that her CO levels appeared to have an upward trend throughout the study, however, her weekly number of cigarettes during post-intervention appeared to trend down. This may be a result of the CO monitor malfunctioning although no other participants exhibited a similar conflicting trend. An additional reason could be that this participant was not inhaling the cigarette fully at the beginning of the study yet was towards the end. However, this participant's number of withdrawal symptoms seemed to trend downwards at post-intervention, which suggests she had not reduced her smoking, consistent with her CO measurements and confirming possible self-report errors in weekly cigarettes smoked.

Although biochemical confirmation was used to verify self-reports there are some limitations to this measure particularly for adolescent samples (Mermelstein et al., 2002). For example, due to the short half-life of expired CO there can be difficulties in detecting sporadic smoking, which is common in adolescence, as the measure can only detect recent smoking.

It must be noted that the MI intervention was not recorded and no quality assurance measures were utilized, however, a member of the MINT delivered the intervention. It is recommended that future research use a measure of MI integrity, such as the Motivational Treatment Integrity code (Moyers, Martin, Manuel, Hendrickson & Miller, 2005).

A further limitation was the administration of initial questionnaire at the beginning of baseline. This means that when comparing baseline data with the data from post-intervention and follow-up questionnaires, results may not only be attributed to the intervention but also possibly influenced by other factors during baseline, such as a friend or family deciding to quit, relationship break-ups, stress, finances i.e. not enough money to buy cigarettes. This however only applied to the data from the initial, post-intervention and follow-up questionnaires, and not the weekly questionnaires, which were continuous data collected throughout the study from the beginning of baseline.

It is important to note some other factors that may have had additional influences on smoking behaviours in this sample. The first being pregnancy, particularly because research indicates that a strong motivator to quit is the discrepancy between one's beliefs of the harm caused from smoking during pregnancy and continued smoking (Naughton, Eborall & Suttin, 2013). This notion is supported by Pickett, Wakschlag, Dai and Leventhal (2003) in a study where almost half of the participants quit or reduced their smoking when they discovered they were pregnant. During the present study three participants became pregnant and similar to the aforementioned study, two of these participants reported reductions in their smoking during their pregnancies that were confirmed biochemically. Subsequently, it must be considered that being pregnant may have had some impact on their reduction in smoking that cannot be attributed to the intervention. The other participant became pregnant after the three-month follow-up and miscarried before the six-month follow-up, therefore no data was collected during her pregnancy. This participant quit smoking after her miscarriage at the six-month follow-up, thus it cannot be discounted that her miscarriage may have had some influence on her decision to quit.

Another influential factor that must be considered is the smoke-free school context, in which the study was conducted. The school was consistently encouraging and promoting a smoke-free environment and during week three of the study an additional smoke-free initiative was introduced, a star chart, to reward students who did not smoke at morning tea, lunch and afternoon tea. The effect this had on participant smoking is unknown, however it is possible that the chart may have had some influence.

The main challenge faced in this research was the collection of data. Data collection days had to be delayed when participants had field trips, assessments, appointments and courses. Public and school holidays caused similar difficulties, however during school holidays data was collected from the participant's home with an aim to minimising the amount of missing data. In addition, many participants were absent from school due to being sick themselves, having sick children or trancies. On these occasions, the absent participant was phoned in an attempt to collect data, however often the phone was not answered. In sum, data is missing where it could not be collected, which subsequently makes it more difficult to distinguish trends in the data and draw conclusions.

It is important to note that the requirement to obtain parental consent for those under 18 to participant in the study raises concerns about selection bias, such that only those parents who are aware of their child's smoking are likely to participate in the study. Furthermore, the study's sample was small and limited to students from one school and thus findings cannot be generalized to the broader population of pregnant youth and young mothers who smoke.

6.3 Implications of the Study's Findings

Increasing smoking cessation and quit attempts is important because smoking causes mortalities (WHO, 2014) and increases the risk of cancers, circulatory disease and numerous adverse health conditions (OECD, 2013) and after an individual quits these risks decrease (Shields, Garner & Wilkins, 2013). In fact, long-term cessation (10 years for women) has been shown to improve health-related quality of life to a level similar to that of non-smokers (Shields et al., 2013). Thus, research such as the present study provides information on treatments that could lead to improving an individual's quality of life.

Moreover, interventions that target smoking cessation during pregnancy are particularly important because of the positive health impact on the fetus. For instance, pre-term birth, low birth weight and fetal growth restriction are all adverse health effects associated with maternal smoking. However, if the mother stops smoking early in pregnancy (before 12-15 weeks) the risk of these health issues occurring is the same as it would be for a non-smoker (McCowan et al., 2009; Vardavas et al., 2010).

Although completely quitting smoking has the greatest health benefits for both the mother and child, a reduction in smoking is the next favorable alternative (Karatay et al., 2010). This is highlighted in research that suggests a dose-response relationship between smoking and a worse quality of health (Guitérrez-Bedmar, Seguí-Gómez, Gómez-Gracia, Bes-Rastrollo & Martínez-González, 2009). Likewise, there is a dose-response effect from cigarette consumption on the fetus, whereby the risk of preterm delivery is increased according to the number of cigarettes smoked daily (Fantuzzi et al., 2007). Thus, in the present study, the reduction in smoking by some participants was still worthwhile.

The only notable difference between the participant who quit smoking and the other participants was her answer at baseline to who would be of most help to her in quitting tobacco products. The participant who quit reported herself while all other participants reported other people. This finding suggests that she may have had a greater sense of self-efficacy with regards to quitting smoking, which could have facilitated her ability to quit. For example, Bandura (1997) postulates that higher self-efficacy beliefs establish higher goal setting, effort, preservation and resilience. Therefore, promoting self-efficacy is important for over-coming barriers when trying to quit smoking (Bandura, 1997). This is because those with higher self-efficacy are more likely to envisage successful outcomes and view failures as temporary setbacks, which required them to increase their efforts, whereas those with lower self-efficacy tend to blame their inadequacies or things that might go wrong and give up.

Therefore, although successful MI supports both the importance and confidence to change (Miller & Rollnick, 2013), perhaps there needs to be a particular focus on facilitating self-efficacy for pregnant youth and young mothers with regards to smoking cessation, especially because the present study found high levels of participant perceived importance to quit while their perceived confidence in their ability to quit was lower. Moreover, many participants lived in environments where others smoked or had close friends who smoked, which may have lowered their sense of self-efficacy and led to their belief that others would be most helpful in their recovery. As a result, perhaps there also needs to be a focus on other members of the household who also smoke, possibly in the form of a holistic intervention.

Consistent with other research that has revealed the substantial within-person variation in smoking behaviour over the course of pregnancy (Pickett et al, 2003; Hayes et.

al., 2013) and reviewed the variable patterns of smoking during adolescence (Mermelstein et al., 2002), this study suggests similar complexities in smoking among pregnant youth and young mothers. Thus, this supports the need for tailored interventions in a cohort that presents unique challenges as well as the potential usefulness of research using single case experimental designs that exposed smoking behaviours and patterns in this population.

6.4 Future Research Recommendations

The present study was the first known study to implement MI with students who had resisted repeated offers of smoking cessation support from a school where they were struggling with the smoke-free school environment. Although research suggests that MI is effective for smokers with low motivation (Catley et. al., 2012), MI in the present study did not increase student motivation to join a quit smoking support group. However, at the commencement of this study most participants were thinking about quitting smoking in the future. Therefore, perhaps a different intervention should have been implemented in this cohort: for instance, research supports the effectiveness of cognitive-behavioural skills training for smokers with pre-existing intentions to quit (Ahluwalia et. al., 2006). Thus, it could be of value to examine cognitive-behavioural skills training for smoking cessation with pregnant youth and young mothers.

However, perhaps more MI sessions are required to produce better smoking cessation rates in this population. Although the optimal number of sessions required for MI is unclear (Lai et al., 2010), some evidence suggests that more MI sessions are likely to produce better outcomes (Lundahl & Burke, 2009). Moreover, for youth, Sussman et al., (2006) report

higher quit rates from programs with five or more sessions and Stotts et al., (2002) report higher abstinence rates among pregnant women who received more intervention sessions.

Additionally, the number of MI sessions may need to be determined based on the amount an individual smokes. For instance, Stotts et al. (2009) employed a single session of MI plus ultrasound feedback as their intervention and found that only light smokers had significantly higher abstinence rates from smoking compared to a control group with ultrasound feedback. Likewise, the only participant to quit in the present study was a relatively lighter smoker (according to her CO levels and weekly reported cigarettes smoked) and received less MI sessions than most other participants.

Furthermore, adding booster sessions or personalised feedback should be considered as a way to enhance effectiveness. Evidence for these additions comes from Karatay et al., (2010) who evaluated an MI intervention that included three additional follow-up sessions for smoking cessation with pregnant women and found positive cessation results. Moreover, Lundahl et al. (2010) found MET, a variant of MI, which includes an additional feedback component, significantly more effective than MI alone. An additional component in feedback, which could be considered in future research with this population, is feedback on fetal or maternal health status related to smoking, as feedback of this nature has been shown to be more effective for smoking cessation than usual care when combined with other strategies, for example, MI (Chamberlain et al., 2013).

In addition, research supports the improved effectiveness of combining pharmacological and behavioural interventions for smoking cessation in the general population (Stead & Lancaster, 2012a; Stead & Lancaster, 2012b). Thus, perhaps combining

MI with NRT could be more effective with pregnant youth and young mothers, especially as the use of NRT during pregnancy can avoid exposure to teratogens in cigarette smoke, for example carbon monoxide (Tappin et. al, 2005).

Similarly, motivational smoking cessation programmes in schools that have been found effective at increasing quit rates and motivation, in addition to promoting changes in smoking behaviours, all incorporate MI with other components, such as, teaching positive social skills, stress management and coping skills (Baker et al., 2012; Oredein, et al., 2008). Thus, it seems feasible that integrating MI with other intervention strategies may increase smoking cessation rates with among pregnant youth and young mothers (Grossberg, 2012; Brown et al., 2003). Other effective strategies for smoking cessation with pregnant women and youth, which could be combined with MI, include financial incentives, CBT and social influence approaches (Stanton & Grimshaw, 2013; Chamberlain et al., 2013; Sussman et al., 2006). The present study's delivery of MI within a smoke-free school environment that offered peer support and provided incentives, such as certificates and rewards for not smoking, demonstrated some promise for such a treatment combination.

Another treatment combination that could be worth investigating for smoking cessation with pregnant youth and young mothers is MI incorporated with the SNAP Model. West (2005) offers PRIME theory, which the SNAP model is based on, as an alternative to the TTM. Research has evaluated MI in combination with the TTM in similar populations (Baker, et. al., 2012; Karatay et al., 2010; Erol & Erdogan, 2008); however, no known research has been conducted on MI in combination with the SNAP Model. The SNAP model focuses on creating a momentary desire to stop, or setting a definite quit date in the

immediate future. Thus, such an intervention could be particularly beneficial to youth as they experience large variability in their motivation to quit smoking.

Furthermore, challenges, such as partner, family and peer smoking may have moderated the effectiveness of the intervention and need to be addressed. Future research could evaluate the impact of a more inclusive intervention with these parties. Perhaps such an intervention could be implemented in the school as a group. The approach seems worthwhile because adolescent smoking behaviour is reinforced when they associate with others who smoke (Kobus, 2003) and all participants in the present study had close friends who were smokers and nearly all lived with smokers. Furthermore, one participant mentioned how when she enrolled at the school she was an ex-smoker and started again because she was leaving school grounds with the other students who smoked on breaks. Therefore, although MI has been found less effective in a group format as opposed to individually (Lundahl & Burke, 2009) it may be more beneficial in this cohort. It is particularly important to include the family of young mothers as the amount of smoking in the family has been positively linked to the severity and frequency of child health issues associated with ETS exposure (Ladomenou et al., 2009). As previous speculated that because the participants in the study were associating with many people who smoked, their sense of self-efficacy may have been lowered and lead to their belief that others would be most helpful in their recovery. This is further reason to include those smokers whom the individual associates with in the intervention.

It should be mentioned that single-case research is particular good for evaluating novel ideas such as the present study because it is low cost and low risk due to its small-scale design (Blampied, 2013). As a result, generalisation of these research findings can be

achieved through repetitions of this single-case research, which is much more cost-effective than repeating large scale RCTs. Additional repetitions of single-case research with treatments that combine multiple components and/or with different people in diverse settings will extend the evidence for generality.

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Appendices

Appendix A- University of Canterbury Ethics Committee Approval



HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2013/59

24 July 2013

Shay de Bruin
Department of Health Sciences
UNIVERSITY OF CANTERBURY

Dear Shay

The Human Ethics Committee advises that your research proposal "Motivational interviewing for smoking cessation: with pregnant youth and young mothers within a Smokefree school setting study" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your emails of 5 and 23 July 2013.

Best wishes for your project.

Yours sincerely

A handwritten signature in black ink, appearing to read 'L. MacDonald'.

Lindsey MacDonald
Chair
University of Canterbury Human Ethics Committee

Appendix B - Tobacco Control Research Tūranga Masters Scholarship

24 May 2012

Shay de Bruin
473 Old Tai Tapu Road, R D 2
CHRISTCHURCH 7672

Tēnā koe Shay

Thank you for your response to our letter dated 9 May addressing the comments raised from your original application.

We have pleasure in confirming that your application for a New Zealand Tobacco Control Research Tūranga Masters Scholarship has been successful.

We were impressed with your response to our queries and are happy to support you with this topic.

The next step is that we will contact the University of Canterbury Scholarship Office to set up the Scholarship with them.

We have attached a copy of our Guidelines for Researchers which all Tūranga Researchers are expected to comply with.

Congratulations again. If you have any questions, do not hesitate to contact us. We will be in touch further with any requirements our end. We would like to celebrate this with a small news item on our website and add a profile of you and your intended topic there also. If you could send us a photo and a short bio to use that would be greatly appreciated.

Yours sincerely

Associate Professor Chris Bullen and Dr Marewa Glover
Tūranga Co-Directors



Dr Chris Bullen
Director, National Institute for Health Innovation
Joint Director, NZ Tobacco Control Research Tūranga

Telephone 64 373 7599 ext 84730
Mobile: 012 415 267
Facsimile 64 9 373 1710
Email: c.bullen@auckland.ac.nz



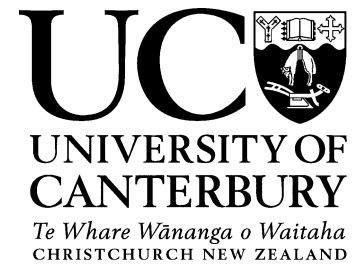
Dr Marewa Glover
Director, Centre for Tobacco Control Research
Joint Director, NZ Tobacco Control Research Tūranga

Telephone 64 373 7599 ext 86044
Mobile 027 2757 852
Facsimile 64 9 303 5932
Email: m.glover@auckland.ac.nz



Appendix C - Participant Information Sheet**School of Health Sciences**

Telephone: +64 3 366 7001 ext 8691
Shay lee de Bruin (sld65@uclive.ac.nz)
Date: 16/04/2012



Motivational Interviewing for Smoking Cessation: With Pregnant Youth and Young Mothers within a Smokefree School Setting Study

Information Sheet for Participants

You are invited to participate as a subject in the research project, motivational interviewing for smoking cessation: with pregnant youth and young mothers within a smokefree school setting. This study is being conducted by Shay lee de Bruin under the supervision of Dr Mark Wallace-Bell and Dr Eileen Britt, lecturers in the School of Health Sciences at the University of Canterbury. The aim of this research is to investigate whether motivational interviewing, within a smokefree school environment, can encourage pregnant youth and young mothers to quit smoking.

Your involvement in this study will require you to attend up to four motivational interviewing sessions (each approximately an hour long) over a 6-week period. Motivational Interviewing is a collaborative conversation to strengthen a person's own motivation for and commitment to change.

You will also be asked to answer questions on a weekly basis, for 12 weeks, about your smoking habits. These questions will ask about your weekly tobacco use, motivation, confidence and importance to quit and withdrawal symptoms. You will also be asked to perform a breath test twice a week to test for carbon monoxide levels in your exhaled breath. The tasks are expected to take approximately 15 minutes a week and a \$10 dollar supermarket voucher will be given as a weekly incentive for the completion of these tasks.

Other questions will also be asked before your attendance at the sessions. These questions include basic demographic information, your history of tobacco use, previous withdrawal symptoms, motivation to quit and your current social support.

As a follow up to this study, you will be asked to complete a questionnaire on your smoking habits 3 and 6 months after your attendance of the last session. Each questionnaire will take approximately 15 minutes and the same \$10 supermarket voucher incentive will be given for their completion.

The questionnaires and breath tests will be performed at Kimihia Parents College in the presence of school staff and guided by the researcher.

The direct benefits to you for participating in my research project are the likelihood of increased motivation and confidence to quit smoking and/or the possibility that you may quit or reduce your smoking. In addition, the results of this project might help other schools, health promoters and researchers to learn more about strategies that may facilitate smoking cessation. There is little or no risk to you in participating in this project.

Participation in this research project is voluntary. You can choose freely to participate or not to participate. In addition, at any point during this project, you can withdraw your permission, and you can stop participating without any penalty. If you withdraw during the course of the study you can elect to have any information relating to you removed from the project.

You may receive a copy of the project results by either contacting the researcher at the conclusion of the project or by requesting a summary of the results on the consent form.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of participants will not be made public without your prior consent. When I report the results of my research project, I will not use your name, instead, I will use a pseudonym (fake name). To ensure anonymity and confidentiality, all hard copies of questionnaires will be stored in a secure location and will be destroyed after 5 years. In addition data will be stored on a secure password protected computer. Only my University of Canterbury supervisors and I will have access to the data. My final research project will be made publically available in the University of Canterbury library.

This research is being carried out as a requirement for a Masters of Science (Child and Family Psychology) by Shay lee de Bruin who can be contacted at sld65@uclive.ac.nz; I will be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Ethics Committee, and participants should address any complaints to the Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in the study, please fill out the consent form and return it to the researcher

Shay de Bruin

Appendix D – Participant Consent Form**School of Health Sciences**

Telephone: +64 3 366 7001 ext 8691

Shay lee de Bruin (sld65@uclive.ac.nz)

Date: 16/04/2013

**Consent Form**

Motivational Interviewing for Smoking Cessation: With Pregnant Youth and Young Mothers within a Smokefree School Setting

Name of Researcher:

Shay lee de Bruin (Masters Student, University of Canterbury)

**Please
tick box**

1. I confirm that I have read and understand the information sheet dated:.....
for the above study. I have had the opportunity to consider the information, and have been
given a contact if I have any questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at anytime,
without giving any reason, and my withdrawal will have no negative consequences on me. ☐
3. I understand that my participation is confidential, i.e., that any information provided by me is
confidential, and my demographic information will not be able to be traced back to me. ☐
4. I consent to publication of the results of the project with the understanding that confidentiality
will be preserved. ☐
5. I agree to take part in the following study ☐
6. I would like a weekly \$10 supermarket voucher for (*tick **only one***):

Pak n' Save

 Countdown
 Or New World

☐

☐

☐
7. I would like to be contacted by phone to arrange dates and times for Motivational Interviewing
sessions and text messaged on the day as a reminder ☐
8. I would like a summary of the study's results emailed to me. ☐

Name of participant

Signature

Date

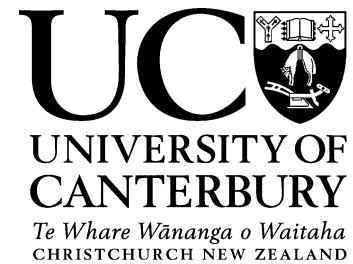
Cell phone number

Home phone number

Email (*optional*)

Appendix E – Parental Consent Form**School of Health Sciences**

Telephone: +64 3 366 7001 ext 8691
Shay lee de Bruin (sld65@uclive.ac.nz)
Date: 16/04/2013

**Parental Consent Form**

Motivational Interviewing for Smoking Cessation: With Pregnant Youth and Young Mothers within a Smokefree School Setting

Name of Researcher:

Shay lee de Bruin (Masters Student, University of Canterbury)

My name is Shay de Bruin. I am a graduate student at the University of Canterbury. One requirement for earning my Master's degree in Child and Family Psychology is to do a research project (thesis). The purpose of my research project is to investigate whether motivational interviewing, within a smokefree school setting, can promote smoking cessation among pregnant youth and young mothers. I am asking your permission for your daughter to participate in this project. I also will ask your daughter if she agrees to participate in this project.

Project Description - Activities and Time Commitment: If your daughter participates her involvement in this study will require her to attend up to four motivational interviewing sessions (each approximately an hour long) over a 6-week period. Motivational Interviewing is a collaborative conversation to strengthen a person's own motivation for and commitment to change.

She will also be asked to answer questions on a weekly basis, for 12 weeks, about her smoking habits. These questions will ask about her weekly tobacco use, motivation, confidence and importance to quit and withdrawal symptoms. She will also be asked to perform a breath test twice a week to test for carbon monoxide levels in their exhaled breath. The tasks are expected to take approximately 15 minutes a week and a \$10 dollar supermarket voucher will be given to your daughter as a weekly incentive for the completion of these tasks.

Other questions will also be asked before your daughter's attendance of the sessions. These questions include basic demographic information, their history of tobacco use, previous withdrawal symptoms, motivation to quit and their current social support.

As a follow up to this study, your daughter will be asked to complete a questionnaire on their smoking habits 3 and 6 months after their attendance of the last session. Each questionnaire

will take approximately 15 minutes and the same \$10 supermarket voucher incentive will be given for their completion.

The questionnaires and breath tests will be performed at Kimihia Parents College in the presence of school staff and guided by the researcher. If you would like to see a copy of all of the questions on the questionnaire forms, please contact me via the email address listed near the end of this consent form.

Benefits and Risks: The direct benefits to your daughter for participating in my research project are the likelihood of increased motivation and confidence to quit smoking and/or the possibility that they may quit or reduce their smoking. In addition, the results of this project might help other schools, health promoters and researchers to learn more about strategies that may facilitate smoking cessation. I believe there is little or no risk to your daughter in participating in this project. If, however, your daughter becomes uncomfortable or stressed during the research, we will take a break or withdraw from the project altogether.

Confidentiality and Privacy: During this research project, I will keep all data from the questionnaires in a secure location. To ensure anonymity and confidentiality, all hard copies of questionnaires will be stored in a secure location and will be destroyed after 5 years. In addition data will be stored on a secure password protected computer. Only my University of Canterbury supervisors and I will have access to the data. When I report the results of my research project, I will not use your daughter's name. Instead, I will use a pseudonym (fake name) for your daughter. If you would like a copy of my final report, please contact me at the email listed near the top of this consent form. My final research project will be made publically available in the University of Canterbury library.

Voluntary Participation: Participation in this research project is voluntary. Your daughter (and you) can choose freely to participate or not to participate. In addition, at any point during this project, you can withdraw your permission, and your daughter can stop participating without any penalty. If you withdraw during the course of the study you can elect to have any information relating to your daughter removed from the project.

Questions: If you have any questions about this project, please contact me, Shay de Bruin via e-mail (sld65@uclive.ac.nz). If you have any questions about your rights, or the rights of your child as a research participant, you can contact the University of Canterbury Human Ethics Committee, via email (human-ethics@canterbury.ac.nz).

Please keep the prior portion of this consent form for your records.
If you consent for your child to participate in this project, please sign the following signature portion of this consent form and return it to Pat Manson at Kimihia Parents College.

Tear or cut here

Signature(s) for Consent:

I give permission for my daughter to participate in the research project entitled, *Motivational Interviewing for Smoking Cessation: With Pregnant Youth and Young Mothers within a Smokefree School Setting*. " I understand that, in order to participate in this project, my daughter must also agree to participate. I understand that my daughter and/or I can change our minds about participation, at any time, by notifying the researcher of our decision to end participation in this project.

Name of Child (Print):

Name of Parent/Guardian (Print):

Parent/Guardian's Signature:

Date: _____

Appendix F – Initial Questionnaire**School of Health Sciences**

Telephone: +64 3 366 7001 ext 8691
 Date: 16/04/2012



Motivational Interviewing for Smoking Cessation: With Pregnant Youth and Young Mothers within a Smokefree School Setting Study

Initial Questionnaire

By completing the questionnaire it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that confidentiality will be preserved.

Personal Information

First Name_____ Last Name_____

Age_____

Gender_____

School Year_____

Qualifications_____

Number of Children_____

Which ethnic group do you belong to? (Mark the space or spaces which apply to you)

New Zealand European ☐ Tongan ☐

Maori ☐ Niuean ☐

Samoan ☐ Chinese ☐

Cook Island Maori ☐ Indian ☐

Other such as *DUTCH, JAPANESE, TOKELAUAN* ☐

Please state: _____

Living Situation:

Renting or Boarding	Yes	No
Living with either your parents or partners parents	Yes	No
Living with partner	Yes	No
Living alone	Yes	No
Is your home smokefree?	Yes	No
Does your partner smoke?	Yes	No

Marital Status (Tick only one):

Single	<input type="checkbox"/>
In a relationship	<input type="checkbox"/>
Married	<input type="checkbox"/>

Other (please define) _____

Tobacco Use History Questions

Please tick, which applies to you.

In the past, I have smoked cigarettes. ☐

I currently smoke cigarettes. ☐

How many cigarettes do you smoke *per weekday*? _____

How many cigarettes do you smoke *per weekend day*? _____

How many days in the last 30 days have you smoked or used tobacco? _____

How old were you when you first tried tobacco? _____

How old were you when you first began using tobacco on a regular basis (e.g. every week)?

What is the main reason that you smoke? Tick only one.

To help me fit in with my peers. ☐

To help me look/act older. ☐

To give me something to do. ☐

To help me relax/feel calm. ☐

To help control my weight. ☐

To help me think/concentrate ☐

☐ Other (please specify below) _____

How soon after you wake up do you smoke your first cigarette or use tobacco products?

_____ Hours _____ minutes

What brands of tobacco have you used in the last 30 days? List each brand and then circle if it is Menthol or Mild/Light.

Brand	Menthol	Mild/Light
_____	Yes No	Yes No
_____	Yes No	Yes No
_____	Yes No	Yes No
_____	Yes No	Yes No

Which brand is your favorite? _____

Nicotine Withdrawal Symptoms Questions

Please circle yes or no

Do you ever have strong cravings to smoke? Yes No

Have you ever felt like you really needed a cigarette? Yes No

When you tried to stop smoking, or when you haven't used tobacco for a while...

Did you find it hard to concentrate?	Yes	No
Did you feel more irritable?	Yes	No
Did you feel a strong need or urge to smoke?	Yes	No
Did you feel nervous?	Yes	No
Did you feel restless?	Yes	No
Did you feel anxious?	Yes	No
Did your appetite increase?	Yes	No
Did you have difficulty sleeping?	Yes	No
Did you have feelings of sadness?	Yes	No
Have you ever felt like you were addicted to tobacco?	Yes	No

Quit History Questions

Have you ever tried to quit, but couldn't?	Yes	No
How many times have you tried to quit? _____		
What is the longest period that you have been smokefree for? _____		
Do you smoke now because it is really hard to quit?	Yes	No

Motivation Questions

Please tick the one statement that best describes your current situation with regard to your tobacco use.

- I would like to quit tobacco within the next 30 days ☐
- I am thinking about quitting tobacco use in the next 6 months ☐
- I am not thinking about quitting tobacco use but I am thinking about cutting down ☐
- I have no desire to quit smoking. ☐
- I have already quit smoking, but would like some help to stay quit. ☐

Are you interested in joining a stop smoking support group? Yes No

I would rate my current motivation to quit smoking/tobacco as... (Circle one)

Not at all Motivated	Slightly Motivated	Somewhat Motivated	Very Motivated	Extremely Motivated
-------------------------	-----------------------	-----------------------	-------------------	------------------------

What are your main reasons for wanting to quit tobacco products?

Social Support Questions

Who do you think will be helpful to you in quitting tobacco products?

Do you live with a smoker(s)? Yes No

Are most of your close friends smokers? Yes No

Are you allowed to smoke at home? Yes No

Appendix G – Weekly Questionnaires**School of Health Sciences**

Telephone: +64 3 366 7001 ext 8691
Date: 16/04/2012



**Motivational Interviewing for Smoking Cessation: With Pregnant
Youth and Young Mothers within a Smokefree School Setting Study**

Weekly Questionnaire

By completing the questionnaire it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that anonymity will be preserved.

Name: _____ Date: _____

Have you used any tobacco in the last 7 days? Yes No

If you answered no, when did you quit? _____

If you answered yes, how much tobacco have you used during the past 7 days?

Monday: _____

Tuesday: _____

Wednesday: _____

Thursday: _____

Friday: _____

Saturday: _____

Sunday: _____

Have you reduce your tobacco consumption Yes No

If yes, by how much _____

Are you interested in joining a stop smoking support group? Yes No

How would you rate your motivation to quit smoking/tobacco use? ... (Circle one)

Not at all Motivated	Slightly Motivated	Somewhat Motivated	Very Motivated	Extremely Motivated
-------------------------	-----------------------	-----------------------	-------------------	------------------------

Please rate yourself for the past 7 days using the following scale:

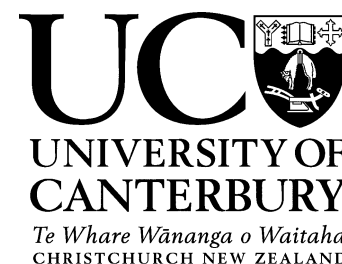
	None	Slight	Mild	Moderate	Severe
Depressed mood (sad)	0	1	2	3	4
Insomnia (sleeping problems)	0	1	2	3	4
Irritable, frustrated, angry	0	1	2	3	4
Anxious	0	1	2	3	4
Difficulty concentrating	0	1	2	3	4
Restless	0	1	2	3	4
Increased appetite (hungry)	0	1	2	3	4
Desire or craving to smoke	0	1	2	3	4

[illegible]

Appendix H – Follow-up Questionnaire**School of Health Sciences**

Telephone: +64 3 366 7001 ext 8691

Date: 16/04/2012



**Motivational Interviewing for Smoking Cessation: With Pregnant
Youth and Young Mothers within a Smokefree School Setting Study**

Follow-up Questionnaire

By completing the questionnaire it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that confidentiality will be preserved.

Name: _____

Date: _____

Living Situation:

Renting or Boarding	Yes	No
Living with either your parents or partners parents	Yes	No
Living with partner	Yes	No
Living alone	Yes	No
Is your home smokefree?	Yes	No
Does your partner smoke?	Yes	No

Marital Status (Tick only one):

Single	<input type="checkbox"/>
In a relationship	<input type="checkbox"/>

Married ☐

Other (*please define*) _____

Tobacco Use History Questions

I currently smoke cigarettes. ☐

How many cigarettes do you smoke *per weekday*? _____

How many cigarettes do you smoke *per weekend day*? _____

How many days in the last 30 days have you smoked or used tobacco? _____

What is the main reason that you smoke? Tick only one.

To help me fit in with my peers. ☐

To help me look/act older. ☐

To give me something to do. ☐

To help me relax/feel calm. ☐

To help control my weight. ☐

To help me think/concentrate ☐

☐ Other (*please specify below*) _____

How soon after you wake up do you smoke your first cigarette or use tobacco products?

_____ Hours _____ minutes

What brands of tobacco have you used in the last 30 days? List each brand and then circle if it is Menthol or Mild/Light.

Brand	Menthol	Mild/Light
_____	Yes No	Yes No
_____	Yes No	Yes No
_____	Yes No	Yes No
_____	Yes No	Yes No

Which brand is your favorite? _____

Nicotine Withdrawal Symptoms Questions

Please circle yes or no

Do you ever have strong cravings to smoke? Yes No

Have you ever felt like you really needed a cigarette? Yes No

When you tried to stop smoking, or when you haven't used tobacco for a while...

Did you find it hard to concentrate? Yes No

Did you feel more irritable? Yes No

Did you feel a strong need or urge to smoke? Yes No

Did you feel nervous? Yes No

Did you feel restless? Yes No

Did you feel anxious? Yes No

Did your appetite increase? Yes No

Did you have difficulty sleeping? Yes No

Did you have feelings of sadness? Yes No

Have you ever felt like you were addicted to tobacco? Yes No

Quit History Questions

Have you ever tried to quit, but couldn't? Yes No

How many times have you tried to quit? _____

What is the longest period that you have been smokefree for? _____

Do you smoke now because it is really hard to quit? Yes No

Motivation Questions

Please tick the one statement that best describes your current situation with regard to your tobacco use.

I would like to quit tobacco within the next 30 days ☐

I am thinking about quitting tobacco use in the next 6 months ☐

I am not thinking about quitting tobacco use but I am thinking about cutting down ☐

I have no desire to quit smoking. ☐

I have already quit smoking, but would like some help to stay quit. ☐

Are you interested in joining a stop smoking support group? Yes No

I would rate my current motivation to quit smoking/tobacco as... (Circle one)

Not at all Motivated	Slightly Motivated	Somewhat Motivated	Very Motivated	Extremely Motivated
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What are your main reasons for wanting to quit tobacco products?

Social Support Questions

Who do you think will be helpful to you in quitting tobacco products?

Do you live with a smoker(s)? Yes No

Are most of your close friends smokers? Yes No

Are you allowed to smoke at home? Yes No